August 21, 2019

Ms. Barbara Kunkle
Acting Executive Secretary
Michigan Public Service Commission
7109 W. Saginaw Hwy.
P. O. Box 30221
Lansing, MI 48909

Via E-Filing

RE: MPSC Case No. U-20471

Dear Ms. Kunkle:

The following is attached for paperless electronic filing:

Direct Testimony of Christopher Neme on behalf of Michigan Environmental Council, Natural Resources Defense Council, and Sierra Club

Exhibits MEC-44 through MEC-52

Proof of Service

Sincerely,

Digitally signed by Tracy Jane Andrews
DN: cn=Tracy Jane Andrews, email=tjandrews@envlaw.com, c=US
Date: 2019.08.21 16:09:29 -04'00'

Tracy Jane Andrews
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xc: Parties to Case No. U-20471

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the Application of **DTE Electric Company** for approval of its integrated resource plan pursuant to MCL 460.6t, and for other relief.	Case No. U-20471 ALJ Sally L. Wallace

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DIRECT TESTIMONY OF CHRISTOPHER NEME

ON BEHALF OF MICHIGAN ENVIRONMENTAL COUNCIL, NATURAL RESOURCES DEFENSE COUNCIL, AND THE SIERRA CLUB

August 21, 2019

Table of Contents

I. INTRODUCTIONS AND QUALIFICATIONS

Q: Please state your name, employer and business address.

A: My name is Chris Neme. I am a co-founder and Principal of Energy Futures Group, a consulting firm that provides specialized expertise on energy efficiency, demand response, renewable energy and other clean energy markets, programs and policies. My business address is P.O. Box 587, Hinesburg, VT 05461.

Q: Please describe your educational background.

A: I received a Master of Public Policy degree from the University of Michigan (Ann Arbor) in 1986. That is a two-year, multi-disciplinary degree focused on applied economics, statistics and policy development. I also received a Bachelor's degree in Political Science from the University of Michigan (Ann Arbor) in 1985. My first year of graduate school counted towards both my Masters' and Bachelor's degrees.

Q: Please summarize your business and professional experience.

A: I have worked in the energy industry for more than twenty-five years for clients in more than 30 different states, half a dozen Canadian provinces and several European countries. Much of my work has focused on energy efficiency markets, programs and policies. That includes work to develop or review energy efficiency potential studies; develop or review Technical Reference Manuals ("TRM") of deemed savings assumptions (including the Michigan, Ohio, Illinois and Ontario TRMs); support utility-stakeholder "collaboratives" (including those in Michigan, Illinois and Ohio); negotiate or support development of efficiency program performance incentive mechanisms (including the current Michigan and Ontario

mechanisms, as well as the mechanism included in Illinois' Future Energy Jobs Act passed in late 2016); review or develop efficiency programs; and/or review or develop utility load forecasts. I have also worked on demand response issues, distribution system planning issues, non-wires alternatives, the bidding of energy efficiency resources into capacity markets, and forecasts and analyses of the impacts of strategic electrification. In addition, I have led training sessions on efficiency program design, cost-effectiveness analysis of distributed energy resources and other clean energy issues; published widely on a range of topics; and served on numerous national and regional efficiency committees, working groups and forums.

I co-founded Energy Futures Group in 2010. Since then I have played lead roles in a variety of energy efficiency consulting projects. Recent examples include:

- Representing NRDC in both informal consultations and contested regulatory proceedings in Michigan, Illinois and Ohio on energy efficiency and demand response program designs, cost-effectiveness analyses, evaluation, and shareholder incentive structures; distribution system planning and non-wires alternatives; and integrated resource planning;

- Helping the National Association of Regulatory Utility Commissioners and the Michigan Public Service Commission assess the relative merits of alternative approaches to defining savings goals for utility efficiency programs (focusing on lifetime savings);

- Serving as an appointed expert representative on the Ontario Energy Board's Evaluation and Audit Committee for gas demand-side management;

- Serving on the Management Committee and leading strategic planning and program design for a team of firms, led by Applied Energy Group, that was hired by the New Jersey Board of Public Utilities to deliver the electric and gas utility-funded New Jersey Clean Energy Programs;

- Co-authoring the National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency cost-effectiveness screening of energy efficiency measures, programs and portfolios, which was published in May 2017, as well as a new Manual, scheduled to be published next year (2020), that will address cost-effectiveness frameworks for all distributed energy resources;

- Leading a project for the Northeast Energy Efficiency Partnerships (NEEP) to document lessons learned from utility and other efforts across the United States over the past 25 years to use geographically targeted efficiency programs (sometimes in concert with other distributed resources) to cost-effectively defer capital investment in transmission and/or distribution system infrastructure; and

- Drafting policy reports for the Regulatory Assistance Project on a variety of energy efficiency and related regulatory policy issues, such as whether 30% electric savings is achievable in ten years, the history of efforts across the United States to use geographically targeted efficiency programs to cost-effectively defer transmission and distribution system investments, and the history of bidding of efficiency resources into the PJM and New England capacity markets.

Prior to co-founding Energy Futures Group in 2010, I worked for 17 years for the Vermont Energy Investment Corporation ("VEIC"), the last 10 as Director of its Consulting Division managing a group of 30 professionals with offices in three states.

A copy of my curriculum vitae is attached as Exhibit MEC-44.

Q: Have you previously filed expert witness testimony in other proceedings before the Commission?

A: Yes. I filed testimony in the following Michigan Public Service Commission Dockets:

- U-20164, regarding Consumers Energy's proposed new shareholder incentive mechanism for demand response programs;
- U-18419, regarding DTE's assessment of efficiency potential as part of its IRP put forward by the Company in support of a proposed new gas-fired power plant;
- U-18268, regarding DTE's proposed 2018-2019 gas energy efficiency programs (Energy Waste Reduction) plan;
- U-18262, regarding DTE's proposed 2018-2019 electric energy efficiency programs (Energy Waste Reduction) plan;
- U-18261, regarding Consumers Energy Company's proposed 2018-2021 energy efficiency programs (Energy Waste Reduction) plan;
- U-17771, regarding Consumers Energy Company's proposed amendment to its 2017 energy efficiency programs (Energy Waste Reduction) plan;

- U-17762, regarding DTE's proposed amendment to its 2017 energy efficiency programs (Energy Waste Reduction) plan;
- U-17429, regarding Consumers Energy's estimates of energy efficiency potential in its assessment of alternatives to its proposal to construct a new 700 MW gas-fired power plant (Thetford);
- U-17138, regarding Consumers Energy's proposed modifications to its 2013-2015 Energy Optimization plans;
- U-17049, regarding DTE's proposed modifications to its 2013-2015 Energy Optimization plan;
- U-16670, regarding Consumers Energy's biennial review and Amended Energy Optimization plan; and
- U-16671, regarding DTE's biennial review and Amended Energy Optimization plan.

Q: Have you been an expert witness on energy efficiency matters before other regulatory commissions?

A: Yes, I have filed expert witness testimony on more than 40 occasions before similar regulatory bodies in eleven other states and provinces, including the neighboring jurisdictions of Ohio, Illinois and Ontario.

Q: Are you sponsoring any exhibits?

A: Yes, I am sponsoring the following exhibits:

- MEC-44: Christopher Neme CV
- MEC-45: Response to MECNRDCSCDE-8.23
- MEC-46: Response to MECNRDCSCDE-8.21
- MEC-47: Response to MECNRDCSC-7.69
- MEC-48: Response to MECNRDCSCDE-4.23
- MEC-49: Output Tabs, WP KLB-1-21
- MEC-50 Response to MECNRDCSE-4.19
- MEC-51: Response to MECNRDCSC-8.24 with Attachment
- MEC-52: Response to MECNRDCSCDE-6.15 with Attachment

II. TESTIMONY OVERVIEW

Q: What is the purpose of your testimony?

A: My testimony addresses the energy efficiency component of DTE's proposed integrated resource plan (IRP). I discuss several problems with the way that DTE has characterized and analyzed the relative economic merits of different future levels of savings from energy efficiency programs – otherwise called Energy Waste Reduction (EWR) programs. I also describe a more appropriate alternative set of efficiency assumptions and resulting conclusions regarding economically optimal levels of efficiency.

Q: What are your summary findings?

A: I find that DTE's analysis of energy efficiency in its IRP has several fundamental flaws. As discussed in more detail later in my testimony, those flaws lead to underestimates of the potential impacts and benefits that future efficiency programs could provide relative to DTE's preferred plan. Correcting the flaws also results in different conclusions than those reached by the Company regarding the economically optimal level of energy efficiency investment.

Q: What are the key flaws in DTE's analysis of energy efficiency in its IRP?

A: I have identified and quantified the impacts of four flaws in DTE's characterization and analysis of efficiency scenarios:

1. **DTE's analysis of energy efficiency suffers from an "end effects" problem.** Specifically, the Company includes in its analysis more than 99% of the costs of efficiency programs through 2040, but excludes from its analysis the 15% of benefits

associated with those costs that would be realized post-2040. This biases DTE's analysis in favor of lower levels of efficiency and contributes substantially to the Company's conclusion that 1.50% EWR is the economically optimal level of efficiency under its Tiered Cost assumptions (*i.e.*, the EWR cost assumptions used in its Reference Scenario). If just this one problem with DTE's analysis is corrected, an economic analysis using DTE's Tiered Cost assumptions would instead conclude that 2.00% EWR is the economically optimal savings level. The 2.00% EWR level was already the economically optimal level when DTE used Flat High Cost assumptions for EWR; it becomes even more clearly the least cost savings level under Flat High Costs when end effects are included.

2. **DTE unreasonably assumes that all general administrative costs associated with running portfolios of efficiency programs – the costs of market research and pilot programs, general (not program-specific) marketing, and evaluation – increase proportionally with the costs of the efficiency program in those portfolios**. That is an unreasonable assumption. As savings increase above a 1.50% EWR level, most of the spending increase is likely to be associated with offering higher incentive levels for the same measures offered through the same or very similar programs. If a program budget doubles just because the rebate levels have been increased, the cost of evaluating the program should not materially change; it certainly should not increase by anything close to double, as DTE's approach has implicitly assumed. Similarly, if increased rebate levels across all programs cause total spending across all programs to double, spending on pilot programs and general (non-program specific) marketing should not need to double. A much more reasonable assumption is that all portfolio-

level costs will increase in proportion to increases in savings rather than in proportion to increases in program spending. That is consistent with DTE's own assumption about how the non-rebate components of its efficiency program costs will increase between different EWR savings levels. Just changing DTE's estimates of increased spending on pilots, general marketing and evaluation costs to increases proportional with increased savings – *i.e.*, without making any of the other adjustments I recommend – would lower the net present value of revenue requirement (NPVRR) of the cost difference between the 2.00% and 1.50% EWR levels by nearly $70 million under DTE's Tiered Cost assumptions. This change nearly (by itself) eliminates the NPVRR advantage DTE estimated for the 1.50% EWR level.

3. **DTE underestimates the reduction in line losses associated with energy efficiency savings, particularly at the time of system peak.** The Company uses the same 6.8% average annual line loss factor to convert both customer energy savings and customer peak demand savings to savings at generation. However, losses grow as load grows, so marginal loss rates – the loss rates relevant to the impacts of energy efficiency savings – are higher than average loss rates, particularly at the time of system peak. As a result, DTE's use of average rather than marginal loss rates biases the Company's comparison of the relative merits of different levels of efficiency in favor of lower levels of efficiency by artificially shrinking the difference in generation savings and benefits between different EWR levels (while cost differences remain unchanged). For example, when using marginal line loss rates instead of average loss rates, the NPVRR for the 2.00% EWR level shrinks by $25 million more than the NPVRR for the 1.50% EWR.

4. **DTE significantly overstates the amount of future efficiency program savings that is embedded in its load forecast**. DTE suggests that it adjusted its Reference Scenario load forecast so that 1.50% new annual efficiency savings is embedded in it. On the residential side, DTE did this by adjusting the Company's end use load forecast by the actual residential savings the Company's EWR programs achieved from 2009 through 2018 as well as the amount of new residential savings the Company estimated it would need to achieve to meet future 1.50% EWR savings levels across all customers. On the commercial and industrial (C&I) side, the Company assumed its initial regression-based forecast had 1.15% savings – the amount the Company assumed its C&I customers saved on average from 2009 to 2016 – embedded in it. The Company then adjusted that regression-based forecast by adding the additional savings necessary to get to a 1.50% savings level. However, there are two major problems with Company's approach:

a. The actual average C&I savings achieved from 2009 through 2016 was much less the 1.15% assumed by DTE. Just correcting this problem reduces the amount of new EWR savings in DTE's Reference Scenario forecast to an annual average of about 1.23% instead of 1.50%. That means the Company has underestimated the amount of efficiency savings it would realize by 129 MW in 2025 and 228 MW in 2040.

b. Whatever the actual average C&I savings achieved from 2009 through 2016, the amount of savings embedded in the Company's initial regression-based C&I forecast must be less than that because it used data from many years prior to 2009 – when it offered no efficiency programs – in its regression analyses. Correcting

for both this problem and the amount of C&I savings actually achieved in 2009 through 2016 reduces the amount of new EWR savings in DTE's Reference Scenario forecast to an annual average of about 0.97% instead of 1.50%. That means the Company has underestimated the amount of efficiency savings it would realize by 254 MW in 2025 and 416 MW in 2040.

Q: What types of impacts could these flaws have regarding the merits of future DTE system management and investment decisions?

A: The first two of these flaws – ignoring end effects and overestimating EWR administration costs – inherently bias the Company's analysis in favor of lower levels of efficiency savings. The third flaw – using average instead of marginal line loss rates – both inherently biases DTE's analysis in favor of lower levels of efficiency and could also affect conclusions regarding when additional capacity may be needed and/or the effects of early retirement of existing capacity. The fourth flaw – overestimating the amount of new efficiency embedded in the Reference Scenario forecasts – could affect conclusions regarding when additional capacity may be needed and/or the effects of early retirement of existing capacity. I quantify the biases in favor of lower levels of efficiency in my testimony. Though I quantify the magnitude of the underestimation of efficiency savings related to the third and fourth flaws, Mr. Evans addresses those flaws related to capacity additions and effects on early retirement of capacity.

Q: Can you summarize the effects of the first three flaws you identified on conclusions regarding the economically optimal level of efficiency?

A: Table 1 separately shows DTE's estimates of the NPVRR of different EWR savings levels – both with and without avoided transmission and/or distribution (T&D) costs – in its Reference Scenario with EWR Tiered Cost assumptions (what I label as 0A and 0B); the effects on NPVRR of separately making each of the three adjustments I proposed (lines 1, 2 and 3); and the combined effects on NPVRR making all three adjustments together. As I noted earlier, and as the first two rows of the table show, DTE estimates that with Tiered EWR cost assumptions the 1.50% EWR savings level is the economically optimal one, slightly better than the 1.75% EWR level. However, when any one of the three corrections I propose are made, the conclusion regarding the economically optimal EWR level changes. For example, just correcting the end effects problem makes the 2.00% EWR the least cost option. When non-program spending increases are more reasonable, the 2.00% EWR level also becomes less expensive than the 1.50% level; however, the 1.75% level is slightly better. When marginal line losses are used instead of average losses, the 1.75% EWR level is least cost. Finally, when all three changes are made together, the 2.00% EWR level is easily the most economic choice. Indeed, when all three changes are made together, the 2.25% EWR savings level becomes less expensive than the 1.50% level and almost as economical as the 1.75% level.

Table 1: Corrected NPVRR for Reference Scenario Using EWR Tiered Costs (millions $)

Adjustments	Total				Incremental to 1.50%			
	1.50%	1.75%	2.00%	2.25%	1.50%	1.75%	2.00%	2.25%
DTE Reference Case								
As Run by DTE in Ref Scenario	$13,278	$13,296	$13,371	$13,637	$0	$18	$93	$359
Including Avoided T&D Benefits	$13,206	$13,211	$13,270	$13,532	$0	$5	$64	$326
Singular Adjustments (Incl. DTE Avoided T&D)								
Include End Effects	$12,488	$12,423	$12,379	$12,586	$0	($65)	($109)	$98
Make Admin Spending Increase Proportional to Savings	$13,206	$13,182	$13,200	$13,418	$0	($24)	($6)	$212
Use Marginal Line Loss Rates	$13,114	$13,108	$13,153	$13,458	$0	($6)	$39	$344
Adjustment Combinations (Incl. DTE Avoided T&D)								
End Effects, Admin $, Line Losses	$12,340	$12,228	$12,121	$12,323	$0	($112)	($220)	($17)

Q: How are the results of the other scenarios analyzed by DTE changed as a result of your corrections to DTE's efficiency analysis?

A: Table 2 compares the results of DTE's analysis with the results of my analysis after correcting the three flaws with the Company's analysis of efficiency for each of four different scenarios – Referenced, Business as Usual (BAU), Environmental Policy (EP) and Emerging Technology (ET) – as well as its sensitivity analysis using EWR Flat High Costs in the Reference scenario. As the Table shows, DTE found 1.50% EWR to be the optimal level of efficiency in its Reference Scenario; 1.75% EWR to be optimal in the EP Scenario; and 2.00% EWR to be optimal in the Reference Scenario with Flat High Costs, the BAU Scenario and the ET Scenario. In contrast, when the corrections I have proposed are made, the 2.00% EWR savings level is the economically optimal level in all five cases. It may also be worth noting that though it is not the least cost option in any Scenario, the 2.25% EWR savings level is lower cost than 1.50% in all but the EP Scenario and the second most cost-effective savings level – after 2.00% EWR – in two of the five cases (BAU and ET).

Table 2: Corrected NPVRR Across Multiple Scenarios (millions $)[1]

Scenarios	Total				Incremental to 1.50%			
	1.50%	1.75%	2.00%	2.25%	1.50%	1.75%	2.00%	2.25%
DTE Analyses (including Avoided T&D)								
Reference	$13,206	$13,211	$13,270	$13,532	$0	$5	$64	$326
Reference w/EWR Flat High Costs	$13,562	$13,417	$13,288	$13,624	$0	($145)	($274)	$62
Business as Usual	$12,615	$12,448	$12,286	$12,606	$0	($167)	($329)	($9)
Environmental Policy	$12,328	$12,218	$12,247	$12,664	$0	($110)	($81)	$336
Emerging Technology	$12,168	$11,964	$11,785	$11,974	$0	($204)	($383)	($194)
Corrected Analyses (End Effects, Admin $ and Marginal Line Losses)								
Reference	$12,340	$12,228	$12,121	$12,323	$0	($112)	($220)	($17)
Reference w/EWR Flat High Costs	$12,696	$12,466	$12,209	$12,487	$0	($230)	($487)	($210)
Business as Usual	$11,749	$11,497	$11,207	$11,468	$0	($252)	($542)	($281)
Environmental Policy	$11,462	$11,267	$11,168	$11,526	$0	($195)	($294)	$64
Emerging Technology	$11,302	$11,013	$10,707	$10,851	$0	($290)	($595)	($451)

Furthermore, as discussed in section IV of my testimony, these corrected results – showing 2.00% EWR to be the economically optimal efficiency investment level – are consistent with the Company's own DSMore cost-effectiveness analyses.

Q: Do you have any other concerns with DTE's analysis of energy efficiency?

A: Yes. Most importantly, DTE appears to have made some simplifying assumptions about how to estimate the costs of acquiring efficiency resources that miss opportunities to optimize efficiency measure selection and minimize costs.

For example, for each level of efficiency the Company established assumptions about how much of the savings should be Residential and how much should be Commercial and Industrial (C&I) based on the split between the net potential estimated for each sector in its

[1] The value of avoided T&D costs is included in all of the values in the table, both DTE's and the corrected analyses. Note that the impacts of using marginal (rather than average) line losses to convert customer energy savings to generation savings were estimated using the Strategist model only for the Reference Scenario. The NPVRR values shown for the corrected analyses in other scenarios assume that the difference in benefits found in Strategist modelling for the Reference Scenario would also be realized in those scenarios (*i.e.*, $9 million NPVRR reduction for 1.50% EWR, $23 million NPVRR reduction for 1.75% EWR, $38 million NPVRR reduction for 2.00% EWR and $47 million NPVRR reduction for 2.25% EWR).

efficiency potential study, without regard to whether that split is the most economic allocation. Indeed, the Company states in discovery that "An optimization without any regard to sector allocations has not been performed."[2]

Similarly, the Company says it established a presumption regarding the amount of savings that should be achieved each year by each end use – what it called its "foundational level" of savings. That foundational level of savings is not economically optimized. The Company then explains that "EWR savings beyond the foundational level were modeled by adding least cost end-use savings…(using) a supply stack approach, selecting incremental end-use savings with the lowest cost and moving up the stack as savings increase."[3] However, it appears as if that was done just within the context of "Base Case" efficiency potential (*i.e.*, when offering 50% financial incentives). Only if there was not enough savings within the Base Case scenario did the Company consider other options such as increasing savings by increasing incentive levels; the Company says that only occurred at savings levels higher than 2.00% EWR.[4] Put another way, the Company does not appear to have considered whether the increase in savings from offering 100% incentives for some less expensive measures might be lower cost for achieving 1.75% or 2.00% EWR savings levels than offering "Base Case" incentives for more expensive measures. For example, in 2021 and 2022 under the 2.00% EWR case, DTE assumed that it would have to maximize acquisition of C&I HVAC savings at a Base Case incentive level – which cost $338 per first year gross MWh saved – when it could have instead acquired additional savings with a 100% incentive

[2] Exhibit MEC-45 (Response to MECNRDCSCDE-8.23d.i).

[3] Direct Testimony of Kevin L. Bilyeu, p. 12, line 17 through p. 13, line 1.

[4] Bilyeu Direct, page 13, lines 5-9 and WP KLB-13.

for much less expensive C&I end uses such as refrigeration.[5] This appears to at least partly explain why the Company's estimates of the cost of 2.00% EWR increase from $177 million in 2020 to $263 million in 2021 and $274 million in 2022, before dropping down to about $240 million per year in 2023 through 2025 when its efficiency potential study suggests that savings less expensive than C&I HVAC become available in the Base Case.

Q: How does the Company's failure to optimize the costs of efficiency acquisition impact the results?

A: As the previous discussion illustrates, the Company's failure to optimize its costs estimates has the effect of biasing its analysis against higher levels of efficiency.

Q: Given the results of your analysis, what do you conclude regarding the level of EWR savings that DTE should pursue?

A: I conclude that remedying the issues I noted in my testimony would show that the Company should ramp up to 2.00% savings by 2021. I also recommend that the Commission instruct DTE to correct for the flaws I have identified in all future IRPs.

[5] Indeed, the additional savings under the 100% incentive level for C&I Refrigeration in 2020 are only about one-third of the cost of C&I HVAC savings under 50% incentive level (WP KLB-13).

III. FLAWS IN DTE'S ANALYSIS OF ENERGY EFFICIENCY POTENTIAL

A. DTE Ignores the Impact of "End Effects"

Q: What are "end effects"?

A: End effects are an analytical problem that occurs when an economic analysis includes the full cost of a resource but not the full life-cycle benefits of that resource. This typically occurs when the timing of costs is different than the timing of the benefits that result from those costs. More specifically, it typically occurs when costs are incurred entirely or mostly within the timeframe of an analysis and a portion of the benefits associated with those costs would be realized outside of that timeframe.

Q: Are there end effects problems with the way DTE analyzed energy efficiency in its IRP?

A: Yes. DTE's IRP analyses extend through the year 2040. In analyzing efficiency, DTE assumes that efficiency programs will be run in each year from 2019 through 2040. Most of those costs are assumed to be expensed – *i.e.*, recovered in the year in which they are incurred. And the small portion that are capitalized are recovered over a relatively short five-year period.[6] As a result, when computing the net present value (NPV) of efficiency costs over the 2019 to 2040 period for its IRP analysis, DTE captures more than 99% of forecast energy efficiency program spending during that period.[7] In contrast, because many efficiency program measures provide savings for at least a decade – and some for twenty

[6] WP LKM-650.

[7] See WP LKM-650. For example, the NPV of Revenue Requirements over the 2019 to 2040 period for the 1.50% EWR level using Tiered Costs is $1.591 billion (Revenue Requirement Summary Tab, cell C11), which is 99.1% of the $1.605 billion NPV when including all post-2040 costs (Revenue Requirement Summary Tab, cell AV23).

years or more – DTE's IRP analyses captures only about 85% of the benefits of that spending.[8]

Q: What are the implications of this end effects problem with respect to conclusions regarding different levels of energy efficiency savings?

A: In a nutshell, DTE's IRP analysis captures virtually all of the difference in costs between different levels of efficiency (*i.e.*, the difference in costs between 1.50%, 1.75%, 2.00%, etc.) but does not capture all of the difference in benefits associated with different levels of efficiency. That biases its IRP analyses of efficiency in favor of lower levels of efficiency.

Q: Have you quantified the magnitude of that bias?

A: Yes. I was able to estimate the magnitude of missing benefits by using the results of DTE's own analyses of different levels of efficiency using DSMore. This software tool is used for analyzing the cost-effectiveness of energy efficiency programs and is used by utilities in more than 30 states,[9] including DTE. DSMore provides both year-by-year estimates of benefits for the first 25 years of an analysis period as well as the full net present value (NPV) of lifecycle benefits (going as far into the future as necessary). Thus, I was able to compute the NPV of the first 22 years of benefits and compare that to the full lifecycle benefits.[10] I

[8] For example, per WP KLB-26, DTE's analysis of the cost-effectiveness of a 1.50% EWR savings level using the DSMore tool suggests that the NPV of total benefits is $4.827 billion (Test Results tab, cell D22). In contrast, the NPV of benefits of just the first 22 years of savings is $4.109 billion (NPV calculation, using a 6.63% discount rate, of the stream of benefits in cells F129 through F150 in the Financial Reports Tab)

[9] DSMore, *The Leading Cost Effectiveness Tool for Energy Efficiency, Demand Side Management and Demand Response Programs,* available at: http://www.integralanalytics.com/files/documents/related-documents/DSMore_Brochure.pdf.

[10] See KLB-24 through KLB-44. The NPV of lifecycle benefits can be found on the "test results" tab, cell D22 for "market-based today" – the version of avoided costs that DTE references because "it most closely reflects the prices in its current forecast." (Exhibit MEC-46, Response to MECNRDCSCDE-8.21). Estimates of annual benefits for the

added to that calculation an estimate of post-2040 avoided T&D costs missing from DTE's analysis.[11] The difference is a good proxy for the value of the "end effects" benefits missing from DTE's Strategist analysis. I was also able to estimate the small amount of post-2040 costs missing from DTE's efficiency analysis by comparing DTE's own estimates of the NPV of 2019-2040 costs to the its own estimates of lifecycle costs.[12]

As shown in Table 3, correcting for the end effects problems with DTE's IRP analysis of different efficiency levels requires increasing the NPV of costs by $14 to $28 million for the 1.50% to 2.25% EWR Tiered Costs cases and increasing the NPV of benefits (or reduced costs) by between $732 million for the 1.50% EWR level and $974 million for the 2.25% EWR level. The net effect is to improve the economic value of the 1.75% EWR by about $70 million, the economic value of the 2.00% EWR level by about $170 million more and the economic value of the 2.25% EWR level by about $230 million more than the 1.50% EWR level.

Table 3: Net Effect of Correcting "End Effects" Problems with DTE's Efficiency Analysis

	Tiered Costs				Flat High Costs			
	1.50%	1.75%	2.00%	2.25%	1.50%	1.75%	2.00%	2.25%
Missing Costs	$14	$17	$22	$28	$17	$19	$22	$28
Missing Benefits	$732	$805	$913	$974	$732	$805	$913	$974
Net Change NPVRR	($718)	($788)	($891)	($946)	($715)	($786)	($891)	($946)
Net Change vs 1.50%	n.a.	($70)	($173)	($228)	n.a.	($71)	($176)	($231)

first 22 years can be found in the "financial reports" tab, cells F129 through F150. I used the Company's 6.63% nominal discount rate to compute the NPV of those 22 years of benefits.

[11] Consistent with the estimate of energy and capacity costs in DSMore, post-2040 T&D benefits are assumed to be 15% of the lifecycle T&D benefits. T&D benefits are about 2% of the total missing benefits shown in the table (i.*e.*, $13 million out of $732 million for the 1.50% EWR level, increasing to $19 million out of $974 million for the 2.25% EWR level).

[12] WP LKM-650.

Q: Are those changes enough, by themselves, to change conclusions regarding which EWR savings level is the economically optimal one?

A: Yes, as the first row in Table 4 shows, DTE concludes that the 1.50% EWR savings level has the lowest net present value of revenue requirements (NPVRR) – about $18 million less than the 1.75% EWR savings level and about $93 million less than the 2.00% EWR savings level – when using its "tiered cost" assumptions for different EWR savings levels. When avoided T&D benefits are included, those gaps narrow: the 1.50% EWR savings level is now only $5 million less than the 1.75% EWR level and $64 million less than the 2.00% EWR level. As the third and fourth rows shows, just correcting for end effects – without addressing any of the other changes or adjustments I suggest in my testimony – the 2.00% savings level becomes the economically optimal level of efficiency: about $75 million less expensive than just pursuing the 1.50% level of savings when not including avoided T&D benefits and about $109 million less expensive when including avoided T&D benefits.

DTE already concluded that the 2.00% EWR savings level was the economically optimal savings level when using "flat high cost" assumptions for efficiency savings. The 2.00% EWR savings level remains the economically optimal savings level after correcting for end effects in the flat high cost sensitivity, but much more solidly so. It is also notable that once end effects are correctly included the 2.25% EWR level becomes preferable to the 1.50% EWR level under Flat High Costs.

Table 4: NPVRR After Correcting End Effects Problems

	Tiered Costs				Flat High Costs			
	1.50%	1.75%	2.00%	2.25%	1.50%	1.75%	2.00%	2.25%
DTE Analysis (excl avoided T&D)	$13,278	$13,296	$13,371	$13,637	$13,634	$13,502	$13,389	$13,729
DTE Analysis (incl avoided T&D)	$13,206	$13,211	$13,270	$13,532	$13,562	$13,417	$13,288	$13,624
Correct End Effects (excl Avoided T&D)	$12,573	$12,523	$12,498	$12,710	$12,932	$12,731	$12,516	$12,802
Correct End Effects (incl Avoided T&D)	$12,488	$12,423	$12,379	$12,586	$12,847	$12,631	$12,397	$12,678

Q: How does DTE claim to address end effects in its IRP analysis?

A: The Company states that its IRP analyses address end effects by an using "an Economic Carrying Charge (ECC) to allocate an appropriate amount of the new plant capital cost to that time period within the study period where the unit was in service."[13] In essence, the Company is suggesting that the use of an ECC spreads the capital costs of each resource analyzed in Strategist over the life of the asset and, by doing so, addresses potential concerns about end effects by including only the portion of the capital costs that are associated with the IRP analysis period (*i.e.*, through 2040) in Strategist's estimates of the net present value of revenue requirements (NPVRR). For example, conceptually, if a resource with a 30-year life is selected for acquisition in 2028, the ECC method will spread the capital cost of that resource over 30 years (2028 through 2057), with only the first 13 years (2028 through 2040) of the resulting annual ECC costs being captured in the calculation of the NPVRR of the scenario analyzed.

[13] Exhibit MEC-47 (Response to MECNRDCSCDE-7.69bi).

Q: Does DTE's use of the Economic Carrying Charge (ECC) mean that only the portion of efficiency program costs that are associated with savings realized within the IRP analysis period are included in Strategist's estimates of scenario costs?

A: No. DTE calculated the NPV of 22 years of energy efficiency costs, for each savings level, outside of Strategist.[14] It then input those single NPV values into Strategist as costs that would be realized at the beginning of the analysis period and set the Strategist "operating life" for efficiency resources – the period of time over which an ECC spreads costs – to 23 years.[15] That means that the entirety of the energy efficiency costs input into Strategist are included in Strategist's calculations of the NPVRR over Strategist's 2018 to 2040 analysis period.[16] Put another way, the use of an ECC does not move any of the energy efficiency costs that DTE input into Strategist to years after 2040 (so none of those costs would be excluded from Strategist NPVRR calculations) even though a significant portion of the benefits of those costs would be realized after 2040 (and therefore are not included in Strategist NPVRR calculations). As I previously stated, that means that there is an end effects problem with the way that DTE analyzed efficiency which inappropriately biases DTE's analysis in favor of lower levels of efficiency.

[14] WP LKM-650.

[15] This information was provided to me by Witness Evans.

[16] Strategist's analysis period was provided to me by Witness Evans.

Q: Would DTE's use of an ECC have had a different result if DTE had modeled the costs of efficiency differently?

A: I expect so. Had DTE input into Strategist 22 different annual costs for each year in the 2019 to 2040 analysis period a significant portion of the costs of efficiency would have been moved outside of the analysis period (*i.e.*, to after 2040) by the application of an ECC, particularly costs for the 2030s. However, that is not the way the Company modeled efficiency costs.

Q: Has DTE offered any other explanation for its approach to potential end effects problems with its modeling of energy efficiency?

A: The Company states that "no costs or savings from any other energy and/or capacity resource option beyond the year 2040 was included" in its analysis and that, as a result, "the treatment of all options, whether demand side or supply side in the optimization, is equivalent."[17] However, there is no such equivalency in the way DTE analyzed efficiency and other alternative resource options because the Company modeled costs of other resources in Strategist as occurring in the year that the resource would be acquired,[18] which means that the use of an ECC could move some costs associated with non-efficiency resources outside of the 2019-2040 period. In contrast, as I previously stated, it modeled 22 years of efficiency costs in Strategist as if they would all be incurred at the beginning of the analysis period, using an operating life that did not move any of the costs outside of the 2019 to 2040 analysis period. Moreover, the Company's explanation does not address the bias inherent in just

[17] Exhibit MEC-48 (Response to MECNRDCSCDE-4.23c).

[18] Information provided to me by Mr. Evans.

comparing different levels of EWR savings to each other when they include more than 99% of the difference in costs between EWR savings levels but only 85% of the difference in benefits.

In response to follow up discovery on this issue, the Company also stated that "it is not necessary to include all benefits or costs from beyond 2040 to properly assess the cost-effectiveness of programs that are installed in the early years of the analysis" and that "[t]o include costs or benefits that extend that far into the future does not change the decisions made for programs installed in the early 2020s."[19] However, that too is an unsatisfactory answer. First, the failure to address end effects undermines the validity of any DTE conclusions regarding longer-term direction suggested by the Company's IRP. Second, the Company's statement that ignoring end effects "does not change the decisions made for programs installed in the early 2020s" is inaccurate because the very analysis that the Company is using to conclude which level of EWR in early 2020s is economically optimal includes program costs that go out to 2040 – and more importantly, *cost differences* between EWR savings levels out to 2040 – without including all of the benefits – and more importantly, the *benefits differences* between EWR investment levels that are associated with programs costs incurred through 2040. The bottom line is that if the Company is going to base its economic analysis of the relative cost-effectiveness of different levels of efficiency spending extended out to 2040, it is inappropriate to exclude some of the benefits associated with that stream of costs.[20] Alternatively, the Company could have analyzed the trade-offs

[19] Exhibit MEC-47 (Response to MECNRDCSCDE-7.69a).

[20] For further discussion of this concept, see Chapter 11 of Woolf, Tim, et al., National Standard Practice Manual for Assessing Cost-Effectiveness of Efficiency Resources, Edition 1, Spring 2017, available at https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf.

of just ramping up to different levels of efficiency through the mid-2020s, holding efficiency levels the same in all cases after that, to determine which level of efficiency was economically optimal in the next five to seven years. However, Company did not perform that analysis.

Q: Have you performed that analysis?

A: Yes. I developed a set of efficiency savings and cost inputs for ramping up to 1.75%, 2.00% and 2.25% EWR only through the year 2025 and then reducing the savings in all three cases to the 1.50% EWR level for the years 2026 through 2040. Those inputs were based entirely on DTE's assumptions using Tiered Costs for efficiency and were applied to DTE's Reference Scenario. As Table XX shows, when Mr. Evans ran those scenarios through Strategist the result was that the economically optimal efficiency level through 2025 was 2.00%.

Table 5: NPVRR of Higher Savings Levels Just Through 2025

	Total				Incremental to 1.50%			
Adjustment	1.50%	1.75%	2.00%	2.25%	1.50%	1.75%	2.00%	2.25%
Revert to 1.50% Savings after 2025 (excluding T&D)	$13,278	$13,268	$13,264	$13,324	$0	($10)	($14)	$46
Revert to 1.50% Savings after 2025 (including T&D)	$13,206	$13,183	$13,163	$13,219	$0	($23)	($43)	$13

I should emphasize that this result excludes adjustments for any of the other concerns I have raised with respect to DTE's analysis of efficiency – all of which would should further improve the standing of 2.00% EWR relative to 1.50% and 1.75% savings levels.

B. DTE Overestimates Ramp-Up in Non-Program Efficiency Costs

Q: What are non-program efficiency costs?

A: DTE includes four energy efficiency budget line items that are not tied to specific programs in its estimates of total efficiency costs:[21]

- Pilots
- Education
- Evaluation
- Performance Incentives

Q: What does DTE assume about the magnitude of those costs?

A: For every level of efficiency, DTE assumes that spending on pilots would be equal to 5% of spending on programs, spending on education would be equal to 3% of spending on programs, and spending on evaluation would be equal to 5% of spending on programs. The Company also assumes that it would earn the maximum performance incentive possible each year, which is equal to 20% of total spending (*i.e.*, the sum of all program spending plus spending on pilots, education and evaluation). In other words, DTE assumes that the amount it would spend on all non-program functions increases in direct proportion to increases in spending on programs.

Q: Are those reasonable assumptions?

A: For performance incentives, DTE's assumption is probably reasonable, since such incentives are explicitly tied to levels of efficiency spending by statute. However, there is no reason to expect spending on pilots and education to grow linearly with total program spending.

[21] See Exhibit MEC-49, Output Tabs, WP KLB-1 through WP KLB-21.

DTE's assumption that spending on evaluation would need to grow linearly in proportion to spending is equally, if not more problematic.

Q: Why is it inappropriate to assume that evaluation spending would grow in proportion to total program spending?

A: Many of the efficiency programs a utility would run at the 1.50%, 1.75%, 2.00%, 2.25% and 2.50% EWR levels would be the same – targeting the same markets, promoting the same measures, using similar program approaches, etc. Once one is already at the 1.50% savings level, most of the differences in program portfolios under more aggressive savings targets would likely be associated with offering higher incentives and/or more aggressive marketing effort so that more customers would participate. However, that should not affect evaluation costs.

Consider a program that offered rebates to residential customers to buy more efficient central air conditioners. If the version of the program offered under a 1.50% EWR savings target paid an average rebate of $300 to 5,000 customers, the utility would incur a rebate cost of $1.5 million. If under a more aggressive EWR savings target the utility would offer the same program except with a higher average rebate of $500 and attract 10,000 participants, its rebate cost would be $5.0 million. The cost of evaluating these two programs would be nearly identical. There may be a little more cost associated with reviewing data entries for twice as many participants. However, the much more substantial cost of any attempt to estimate savings in the field, which would entail metering equipment for a random sample of customers, would likely be about the same. And the cost of writing the evaluation report would also be the same. The cost of making any changes to central air conditioner savings

assumptions in Michigan's Energy Measure Database (MEMD) would also be the same. However, DTE's simplistic assumption that evaluation costs grow linearly with spending could result in about three times as much evaluation funding available for this program under the more aggressive EWR target than under the 1.50% target.[22] That is an unreasonable assumption.

Q: Do other utilities with aggressive efficiency savings targets spend 5% of their total budgets on evaluation?

A: No. For example, Commonwealth Edison, which serves the Chicago area and has an annual electric savings target that is approximately equivalent to 2.00% per year, spends only 3% of its portfolio budget on evaluation.[23] The Massachusetts utilities, which have an annual savings goal equal to 2.7% of sales for each year of their 2019 to 2021 plan, are planning to spend only about 1.6% of their total energy efficiency budgets on evaluation and market research.[24]

Q: What would be a reasonable alternative to the assumptions DTE has made regarding pilot programs, general education and evaluation spending?

A: It would be more reasonable to simply assume that such administrative costs increase in proportion to increases in savings above the 1.50% EWR level (rather than in proportion to

[22] If non-rebate spending was $0.5 million for the smaller program and $1.0 million for the larger program.

[23] Commonwealth Edison, *2018-2021 Energy Efficiency and Demand Response Plan*, filed in Illinois Commerce Commission Docket 17-0312, June 30, 2017, available at: https://www.icc.illinois.gov/docket/files.aspx?no=17-0312&docId=254601.

[24] See MA Energy Efficiency Advisory Council, *Exhibit 1, Appendix C – 2019-2021 Plan Data Table 2-19-19 Statewide Electric.* Available at http://ma-eeac.org/plans-updates/.

cost). In fact, DTE itself has assumed that the non-rebate portion of its efficiency *program* spending would increase in proportion to increases in savings. I see no reason why portfolio-level non-rebate costs should grow any faster.

Q: What would be the impact on the relative costs of the different EWR savings levels if DTE assumed portfolio-level administration costs increased in proportion to savings increases?

A: As Table 6shows, if portfolio-level administration costs were to grow in proportion to savings (*e.g.*, they would be one third higher for a 2.00% EWR savings level than for a 1.50% savings level), it would reduce the cost difference between the 1.50% EWR savings level and the 1.75%, 2.00% and 2.25% EWR levels by $29 million, $70 million and $114 million, respectively. That, in conjunction with the effects of avoided T&D costs, would render both the 1.75% and 2.00% EWR savings levels lower total cost options than the 1.50% EWR level (with the 1.75% level being least cost).

Table 6: NPV Reduced Admin Costs vs. DTE EWR Tiered Cost Assumptions (millions $)

Cost	1.50%	1.75%	2.00%	2.25%
Pilots	$0	$11	$27	$44
General Educ	$0	$7	$16	$26
Evaluation	$0	$11	$27	$44
Total	**$0**	**$29**	**$70**	**$114**

C. DTE Uses Average Rather than Marginal T&D Loss Rates

Q: What are T&D loss rates?

A: When electricity is generated, it must be sent through the utility's transmission and/or distribution (T&D) system infrastructure to residential and business customers. Some of the

electricity is "lost" in the process. Thus, the amount of electricity that needs to be generated is greater than the amount of electricity that is ultimately consumed by residential and business customers. The amount by which it is greater is the T&D loss rate.

Q: Why are loss rate assumptions important in the context of analyses of efficiency program savings in an IRP?

A: DTE and other utilities typically measure efficiency program savings at their customers' homes or businesses. Indeed, that is the way their savings goals are articulated. It is also the way their estimates of future efficiency program savings potential used in IRP analyses are developed. However, in the context of an IRP, the utility must make assumptions about loss rates because they need to understand the impacts that saving electricity at their customers' meters will have on generation requirements. Thus, when developing energy efficiency savings inputs to its IRP model, DTE multiplies estimated savings at their customers' meters by one plus an assumed T&D loss rate.

Q: What is DTE's loss rate assumption?

A: DTE converts both estimated customer energy savings and estimated customer peak demand savings to generation savings using a 6.8% T&D loss rate assumption.[25]

Q: What is the source of that 6.8% loss rate assumption?

A: The 6.8% is an average annual loss rate. DTE witness Bilyeu explains that this value was "approved by the MPSC in DTE Electric's General Rate Cost No. U-15244."[26]

[25] Bilyeu Direct, p. 16, lines 19-22.

[26] Exhibit MEC-50 (Response to MECNRDCSCDE-4.19a).

Q: Is that a reasonable assumption for an average loss rate for DTE?

A: I have no opinion whether it is a reasonable assumption for an average annual loss rate for DTE, but it is not an appropriate rate for estimating the effects of efficiency programs on generation requirements. To the contrary, if it is a reasonably precise estimate of average annual T&D losses for DTE, then it will significantly *understate* the reduction in losses caused by efficiency programs.

Q: Please explain.

A: Line losses grow (largely) exponentially with load.[27] That means that the T&D loss associated with adding one more kWh of demand to the system in any given hour of the year will be higher than the average T&D loss for all kWh of demand at that hour. Simply put, marginal loss rates are higher than average loss rates.

Q: How is that relevant to analyzing the effects of efficiency programs?

A: By definition, efficiency programs savings occur "on the margin". Thus, their impacts on T&D losses should be valued using marginal loss rates. This is clearly explained in the National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources (commonly referred to as the NSPM):

> "When estimating the magnitude of avoided line losses, it is important to recognize that line losses grow exponentially with load. As a result, the marginal loss rate associated with the last increment of load added to – or removed from – the T&D system (i.e. incremental losses divided by incremental load) is greater than the average loss rate for all load (i.e. total

[27] Lazar, Jim and Xavier Baldwin, Valuing the Contribution of Energy Efficiency to Avoided Marginal Line Losses and Reserve Requirements, Regulatory Assistance Project, August 26, 2011. Available at: https://www.raponline.org/knowledge-center/valuing-the-contribution-of-energy-efficiency-to-avoided-marginal-line-losses-and-reserve-requirements/?sf_data=results&_sf_s=lazar+line+loss.

> losses divided by total load). Thus, the magnitude of line loss reductions associated with efficiency savings should be based on estimates of marginal – not average – line loss rates."[28]

Q: How should loss rates be used to convert annual customer peak demand savings to generation capacity savings?

A: Because loss rates grow largely exponentially with load, loss rates used to convert customer peak demand savings to peak demand savings at generation should be higher than loss rates used to convert annual customer energy savings to annual energy savings at generation. This is clearly explained in the NSPM:

> "…there should be separate average marginal line loss rates for energy savings and peak demand savings. By definition, marginal line loss rates at the time of system peak will be considerably higher than the weighted average of marginal line loss rates across all hours of the year when energy is saved."[29]

Q: Does DTE agree that loss rates grow as load grows?

A: The Company has acknowledged both that "from an engineering perspective and with all other things equal", "line loss rates grow as load grows" and that "average line loss rates at the times of peak demand are higher than average line loss rates over the course of the entire year".[30]

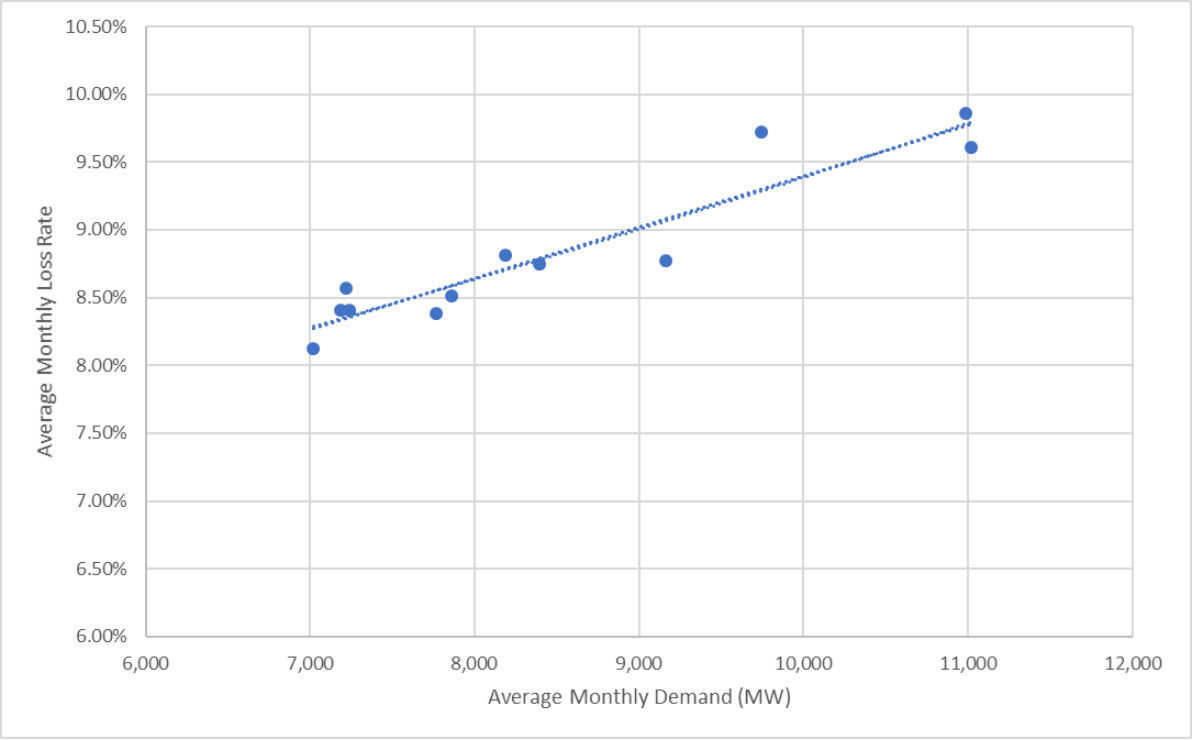
[28] Woolf, Tim, et al., National Standard Practice Manual for Assessing Cost-Effectiveness of Efficiency Resources, Edition 1, Spring 2017, p. 51. Available at https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf.

[29] *Ibid*.

[30] Exhibit MEC-51 (Response to MECNRDCSCDE-8.24b.ii).

Furthermore, data from DTE's 1999 line loss study[31] – apparently the most recent such study conducted by the Company – supports the notion that line losses grow as load grows. The study did not estimate marginal line loss rates; nor did it provide loss rates at the time of system peak. What it did provide are average monthly loss rates. As Figure 1shows, the months with lowest average demands had the lowest average line loss rates; the months with highest average demands (all summer months) had the highest average line loss rates. To be clear, I am not suggesting that loss rates from a 1999 study are necessarily reflective of loss rates on DTE's system today, twenty years later. However, the pattern reflected in the study results – of increasing loss rates as demand grows – is consistent with both engineering expectations and the results of other studies.

Figure 1: Average DTE Monthly Demand and Loss Rates in 1999



[31] Exhibit MEC-51 (Attachment to MECNRDCSCDE-8.24a).

Q: Has DTE explained why it uses an average annual loss rate rather than marginal loss rates for valuing both energy and peak demand savings?

A: The Company states that it has not conducted an analysis of marginal line loss rates. It further states that "consistent with all previous EWR plans approved by the MPSC, the Company uses the less variable value for the calculations."[32]

Q: Is that a reasonable explanation?

A: No. There is no inherent value to using a "less variable" line loss value. As applied to efficiency analysis, "less variable" means less accurate. DTE could use multipliers derived from studies by other utilities to translate its average annual line loss rates to marginal loss rates for both energy and peak demand savings. While it would be best to use marginal loss rates developed through a DTE-specific study, the use of proxy multipliers from other studies would still be more accurate and reasonable than using loss rates that are too low for valuing energy savings, especially with respect to peak savings.

Q: What multipliers should DTE have used?

A: For energy savings, it is reasonable to assume that average marginal loss rates are approximately 1.5 times average annual loss rates. In other words, if DTE's average annual loss rate is 6.8%, its average marginal loss rate could be reasonably estimated to be on the order of 10.2%.

[32] Exhibit MEC-50 (Response to MECNRDCSCDE-4.19b).

For peak demand savings, it is reasonable to assume that the marginal loss rate at the time of system peak is on the order of 2.0 times the average annual marginal loss rate – or about 20.4% for DTE.

These multipliers are consistent with research published several years ago by the Regulatory Assistance Project[33] and an internal study conducted by Commonwealth Edison, the utility serving the Chicago area.[34]

Q: What are the implications of DTE's decision to use average annual line loss rates rather than marginal line loss rates for converting both energy and peak demand savings to generation savings?

A: Using the data referenced above, the Company has understated annual energy savings at generation by about 3% and average peak demand savings at generation by about 13%. The result is an overestimation of both annual electricity generation and peak capacity needs in all of its IRP scenario and sensitivity analyses, and therefore an overestimation of the cost of meeting its customers' needs in all of its analyses.

Also, the Company's use of average loss rates instead of more appropriate marginal loss rates means it has understated the magnitude of the difference in savings and benefits between different levels of efficiency. Put another way, all else equal, the cost-effectiveness of each

[33] Lazar, Jim and Xavier Baldwin, Valuing the Contribution of Energy Efficiency to Avoided Marginal Line Losses and Reserve Requirements, Regulatory Assistance Project, August 26, 2011 (https://www.raponline.org/knowledge-center/valuing-the-contribution-of-energy-efficiency-to-avoided-marginal-line-losses-and-reserve-requirements/?sf_data=results&_sf_s=lazar+line+loss).

[34] See Commonwealth Edison, *2018-2021 Energy Efficiency and Demand Response Plan*, Exhibit A, filed June 30, 2017, Illinois Commerce Commission Docket 17-0312.
Available at: https://www.icc.illinois.gov/docket/files.aspx?no=17-0312&docId=254601.

additional increment of efficiency is better, relative to lower levels of efficiency, than DTE has estimated in its IRP analysis.

Q: By how much has DTE's use of average rather than more appropriate marginal line loss rates understated the difference in benefits between different EWR savings levels?

A: To address that question I estimate how much larger the energy and peak savings would be under the 1.50% EWR, 1.75% EWR, 2.00% EWR and 2.25% EWR savings levels. Mr. Evans then ran those changed savings levels through the Strategist model, without changing any other assumptions in the Reference Scenario, and provided me the resulting NPVRR values. I then added to the results of those revised Strategist runs the additional cost reductions that would be associated with applying marginal rather than average line loss rates to DTE's estimates of avoided T&D costs. In a nutshell, the NPVRR of the 1.50% EWR savings level declined by $92 million, the NPVRR of the 1.75% EWR level by $103 million, the 2.00% EWR level by $117 million and the 2.25% EWR level by $74 million. Again, all else equal, changing the line loss assumption increases the difference in benefits between different savings levels, at least up to the 2.00% savings level. For example, the difference in benefits between the 1.50% and 2.00% level grows by about $25 million.

D. DTE Overstates Efficiency Savings Embedded in its Load Forecast

Q: What does DTE assume about the amount of savings from energy efficiency programs that is embedded in its base case load forecast?

A: DTE states that its "Starting Point load forecast" – the load forecast from which all of its IRP modeling starts – has embedded in it a level of new energy efficiency program savings (often

referred to as Energy Waste Reduction, or EWR program savings) equal to 1.50% of retail sales each year.[35]

Q: What is DTE's basis for that assumption?

A: For the residential sector, DTE developed an end use forecast that explicitly subtracts the cumulative effects of both (1) actual residential EWR savings achieved from 2009 to 2018; and (2) its estimates of the portion of new incremental annual EWR savings at the 1.50% level that would come from residential customers each year from 2019 to 2040.[36]

For the Commercial and Industrial (C&I) sectors, DTE first developed regression-based forecasts for different business market segments. The Company assumed that 1.15% incremental C&I savings per year were embedded in those initial regression-based forecasts. It then subtracted from the sum of its C&I regression-based forecasts the additional C&I savings that it estimated it would have to achieve in the future to reach a 1.50% portfolio level (all sectors) EWR savings per year. For example, the Company estimates that to achieve 1.50% total EWR savings it would need to achieve 461.9 GWh of C&I savings in 2020.[37] The Company estimates that if it had achieved 1.15% C&I savings, that would be equal to 354.1 GWh of new savings in 2020.[38] Since the Company assumed 1.15% savings

[35] Direct Testimony of Markus B. Leuker, p. 13, lines 1-2.

[36] Leuker Direct, p, 12, lines 16-17 and Exhibit MEC-52 (Response to MECNRDCSCDE-6.15b), which shows incremental annual residential savings subtracted from the residential end use forecast at levels very similar to both 2009-2018 actual residential savings levels (WP KLB-22) and forecast future residential savings under a 1.50% portfolio savings level (WP KLB-1).

[37] WP KLB-1 and WP MBL-10.

[38] See WP MBL-10. Note that the workpaper does not show the derivation of the 354.1 GWh assumed to be associated with a 1.15% savings level. However, the ratio of 354.1 to 461.9 GWh is identical to the ratio of 1.15% to 1.50% EWR savings.

was already embedded in its regression-based C&I load forecast, it simply subtracted the effects of an additional 107.8 GWh of savings (the difference between 461.9 and 354.1 GWh) from its regression-based forecast in an effort to produce a C&I load forecast that DTE claims is commensurate with a 1.50% portfolio level EWR savings target each year.

Q: Is the Company's conclusion that its base case forecast has 1.50% of new incremental annual savings embedded in it reasonable?

A: No. The Company's adjustment to its residential end use forecast appears to have been performed in a manner that would reflect both the amount of residential savings historically achieved as well as the amount of savings that would be achieved in the future under a 1.50% annual EWR savings level. However, the Company's C&I forecast has much less new EWR savings embedded in it than the Company has assumed.

Q: What is the basis for your conclusion that the Company's C&I forecast has much less new EWR savings embedded in it than the Company has assumed?

A: There are two fundamental problems with the Company's estimates of the amount of new C&I savings embedded in its C&I load forecast:

1. The Company mistakenly assumed that the average 2009 to 2016 C&I savings level was equal to 1.15% of C&I sales; that overstates its actual average C&I savings over the period in question by about 50%.

2. The Company mistakenly assumed that the amount of new annual savings embedded in its C&I regression-based forecasts was equal to the average annual 2009 to 2016 C&I savings levels, despite the fact that its regression-based forecasts are based – in

most cases – on much longer periods of time, including many years with no efficiency program savings.

Q: Why is the Company mistaken in assuming that the average 2009 to 2016 C&I savings level was equal to 1.15% of C&I sales?

A: As Table 7 shows, the average annual *total savings* (not C&I savings) that DTE achieved from 2009 to 2016 – across all customers – was a little more than 1.15% of *total sales* (not C&I sales). However, that total masks significant differences between Residential and C&I savings levels. In fact, average annual C&I savings from 2009 to 2016 were only 0.74% to 0.81% of C&I sales, depending on how one treats savings from pilot and education programs (what DTE calls "other").

Table 7: DTE 2009-2016 Savings as % of Weather-Normalized Sales[39]

	2009	2010	2011	2012	2013	2014	2015	2016	Average
Savings (MWh)									
Residential	120,535	208,635	306,340	299,724	313,586	311,473	280,634	259,985	262,614
C&I	64,625	155,780	252,866	246,088	248,274	316,238	284,336	303,217	233,928
Other	17,558	38,580	46,366	64,843	51,668	53,928	55,751	67,718	49,552
Total	**202,718**	**402,995**	**605,572**	**610,655**	**613,528**	**681,639**	**620,721**	**630,920**	546,094
Sales (Weather-Normalized MWh)									
Residential	15,217,331	14,980,167	15,213,358	15,061,826	15,248,411	15,114,897	15,055,083	15,181,995	15,134,133
C&I	29,833,686	31,401,233	31,544,350	31,483,057	32,188,945	32,105,744	31,616,766	32,104,769	31,534,819
Total	45,051,017	46,381,399	46,757,708	46,544,882	47,437,356	47,220,642	46,671,849	47,286,764	46,668,952
Savings as % of Sales (excluding "other")									
Residential	0.79%	1.39%	2.01%	1.99%	2.06%	2.06%	1.86%	1.71%	1.74%
C&I	0.22%	0.50%	0.80%	0.78%	0.77%	0.98%	0.90%	0.94%	0.74%
Total	0.45%	0.87%	1.30%	1.31%	1.29%	1.44%	1.33%	1.33%	1.17%
Savings as % of Sales (allocating "other")									
Residential	0.87%	1.54%	2.18%	2.23%	2.25%	2.24%	2.05%	1.92%	1.91%
C&I	0.24%	0.55%	0.87%	0.87%	0.84%	1.07%	0.99%	1.06%	0.81%
Total	0.45%	0.87%	1.30%	1.31%	1.29%	1.44%	1.33%	1.33%	1.17%

As I discuss further below, the amount of new annual C&I savings embedded in DTE's regression-based forecasts must be less than the average C&I savings from 2009 to 2016. However, even if that was not the case – *i.e.*, even if the average C&I savings from 2009 to

[39] Historic savings by sector from KLB-1. Weather-normalized sales from DTE Response to AGDE-1.1.

2016 was the amount embedded in DTE's regression-based forecasts – the Company would have over-estimated the amount embedded by about 50% because the Company achieved much less than 1.15% C&I savings per year over that time period.

Q: Why is the Company mistaken in assuming that the average actual C&I EWR savings from 2009 to 2016 is the amount of new annual efficiency program savings embedded in its regression-based C&I forecast?

A: For most C&I market segments, the Company's forecasts are based on data going back much further than 2009. For example, its forecasts are based on data going back to 1992 for schools, to 1995 for government buildings, to 1995 for retail businesses, to 1996 for office buildings, to 1996 for the auto industry, and to 2000 for hospitals.[40] In fact, on a sales weighted average basis, DTE's C&I forecasts are based on data from more years without efficiency programs than on years with efficiency programs. The Company's assumption that the amount of new annual efficiency program savings embedded in its C&I regression-based forecasts is equal to the average savings achieved during the eight efficiency program years of 2009 to 2016 ignores the effects of data from all the other non-program years on those forecasts. That is not reasonable.

Q: Has the Company provided any empirical analysis to support its implicit contention that the amount of savings embedded in its regression-based forecast is equal to the average savings achieved from 2009 to 2016, and that the effects of data from prior non-program years can be ignored?

[40] WP MBL-8 and WP MBL-9.

A: No. The Company has provided no such analysis.

Q: By how much did DTE over-estimate the amount of new efficiency program savings embedded in the load forecast used in the Reference Scenario for its IRP?

A: As Table 8 shows, just by over-estimating the average C&I savings achieved from 2009 to 2016 – *i.e.*, without making any additional adjustments to account for DTE's other faulty assumption that amount of savings embedded in its C&I forecast is equal to the average 2009 to 2016 savings level – the Company has over-stated the amount of new annual efficiency program savings in its Reference Case forecast by about 805 GWh and 129 peak MW in 2025, growing to over 1300 GWh and 228 MW by 2040. Put another way, if just this correction is made, the incremental average savings included in DTE's Reference Case forecast over the 2019 to 2040 IRP analysis period is only about 1.23% per year rather than the 1.50% per year assumed by DTE.[41]

Correcting for both the actual average C&I savings achieved from 2009 to 2016 and assuming that the average savings embedded in DTE's C&I forecast is only half the corrected 2009 to 2016 amount – since, on average, the Company's C&I forecasts relied on more years of data without efficiency program impacts than years with efficiency program impacts – I calculate that the Company has over-estimated the amount of new efficiency program

[41] This is computed by estimating (1) the number of MWh of incremental annual savings by which I estimate DTE has understated how much it would need to adjust its C&I load forecast each year to ensure it reflected the level of C&I savings associated with a portfolio-level 1.50% savings achievement, and (2) comparing that understated MWh value to the total annual MWh the Company estimated it needs to achieve to meet the 1.50% portfolio savings level. For example, for 2020, I estimate that DTE has understated the amount of C&I savings by which it would need to adjust its C&I forecast to ensure it reflected a portfolio-level 1.50% savings level by about 121 GWh. The Company has estimated its total portfolio-level savings needed to reach a 1.50% savings level in 2020 would be about 701 GWh. Thus, I estimate that the Company's load forecast has embedded in it savings equal to 1.24% of total forecast 2020 sales – [(701-121)/701] *1.50%. The average of such annual values over the 2019 to 2040 period is 1.23%.

savings embedded in its Reference Case load forecast by 1577 GWh and 254 peak MW in 2025, growing to over 2400 GWh and over 400 peak MW by 2040. Put another way, if both of the problems with DTE's load forecast assumptions are corrected, the incremental average savings included in the Company's Reference Case scenario over the 2019 to 2040 IRP analysis period is only about 0.97% per year rather than the 1.50% per year assumed by the Company.[42]

Table 8: Amount by Which DTE Over-Estimates EWR Savings Embedded in Forecast

	2019	2020	2021	2022	2023	2024	2025	2030	2035	2040
Correcting Just Actual Average 2009-2016 C&I Savings										
GWh	69	199	341	497	626	725	805	936	1,074	1,322
Peak MW	10	30	52	78	99	115	129	158	188	228
Correcting Actual Average 2009-2016 C&I Savings + Assumption that Avg 2009-2016 Savings Embedded in Forecast										
GWh	194	447	715	995	1,212	1,403	1,577	1,920	2,020	2,414
Peak MW	29	68	110	156	191	223	254	324	354	416

Q: How does the Company's over-estimation of the amount of efficiency savings embedded in its Reference Case load forecast affect the relative benefits of different levels of future efficiency program savings?

A: The Company's over-estimation of the amount of C&I efficiency savings embedded in its Reference Case forecast affects the starting point for all analyses of the impacts of efficiency. Thus, when one corrects both of DTE's faulty forecasting assumptions, the 1.50% EWR savings level produces an average of 0.53% of additional savings per year relative to DTE's Reference Case forecast, rather than DTE's assumption that it provides no additional savings. The 1.75% EWR level produces 0.78% of additional savings per year, rather than DTE's

[42] This is also an annual average over the 2019 to 2040 period, computed in the same manner as the 1.23% average value reference above.

assumption that it provides just 0.25% additional savings per year relative to its Reference Case forecast. The 2.00% EWR level produces 1.03% of additional savings per year, rather than DTE's assumption that it provides just 0.50% additional savings per year relative to its Reference Case forecast. The increase in savings relative to the Reference Case forecast is the same for all EWR savings levels analyzed by the Company. Put another way, correcting DTE's forecasting assumptions increases the total amount of savings relative to its load forecast for all EWR levels, but does not change the *difference* in savings or costs between the different EWR savings levels the Company analyzed in its IRP.

Q: What is the effect of the Company's over-estimation of the amount of efficiency savings embedded in its Reference Case load forecast?

A: DTE assumes that 1.50% new annual efficiency program savings are already reflected in its Reference Case load forecast. To the extent that the amount of savings embedded in the Reference Case forecast is actually less than that, the Company's IRP analysis overstates both the annual amount of electricity the Company will need to produce or acquire for its customers as well as the amount of peak generating capacity it will need to have in all future years. As a result, it will overstate the future costs of meeting its customers' needs. As shown in the testimony of Mr. Evans, it may also have implications for generation decisions.

IV. DTE's DSMore Analyses Suggest 2.00% EWR is Least Cost

Q: What is DSMore?

A: As I stated earlier in my testimony, DSMore is a software tool used by utilities in more than 30 different states to assess the cost-effectiveness of energy efficiency programs. DTE has itself used this tool for a number of years.

Q: How did DTE use DSMore in the development of its IRP?

A: DTE used DSMore to develop the annual GWh savings values that it input into its Strategist IRP model. DTE witness Bilyeu also referenced the benefit-cost ratios that its DSMore analyses produced under its EWR Tiered Cost assumptions.[43] Those results showed that the 1.50% EWR level had the highest benefit-cost ratio.

Q: Does that mean the 1.50% EWR level is the least cost savings level?

A: No. The magnitude of net benefits is much more important than the benefit-cost ratio. Consider the following two hypothetical options: (1) investing $1 to produce $3 in energy cost savings, for a benefit-cost ratio of 3 to 1 and net savings of $2; and (2) investing $5 to produce $10 of energy cost savings for a lower benefit-cost ratio of 2 to 1 and $5 in net savings. The second example has a lower benefit-cost ratio but would produce the lowest total energy costs. Thus, if a utility (and consumers and regulators) had to choose between those two efficiency program options, the second option would be the economically optimal one.

Q: What do DTE's DSMore analyses suggest is the economically optimal level of efficiency?

A: Table 9 summarizes the results of DTE's DSMore analyses for each level of energy efficiency from 1.50% to 2.25%, for each of three different set of efficiency cost assumptions analyzed by the Company (Tiered Costs, Flat High Costs and Flat Low Costs), and two

[43] Bilyeu Direct, p. 22, lines 1-5.

different estimates of avoided costs (what DSMore calls "today" avoided costs, which are avoided costs DTE believes most closely reflect prices in its current forecast, as well as what DSMore calls an "option value" analysis). All told, the table compares the NPV of net benefits across four different levels of efficiency in each of six different EWR cost/avoided cost combinations. In four of the six combinations – including the one on which DTE primarily focuses (*i.e.*, Tiered EWR costs using "today" avoided costs), the 2.00% EWR level has the greatest net benefits. In the other two cases – both under the "option value" – the 2.25% EWR level has the greatest net benefits.

Table 9: DTE DSMore Results

Tiered Costs

	DTE Avoided Costs				DSMore Option Value			
	1.50%	**1.75%**	**2.00%**	**2.25%**	**1.50%**	**1.75%**	**2.00%**	**2.25%**
NPV Benefits (Billions $)	$4.827	$5.521	$6.305	$6.765	$6.522	$7.459	$8.519	$9.139
NPV Costs (Billions $)	$1.710	$2.196	$2.772	$3.372	$1.710	$2.196	$2.772	$3.372
BCR	2.82	2.51	2.27	2.01	3.81	3.40	3.07	2.71
NPV Net Benefits (Billions $)	$3.117	$3.325	$3.533	$3.393	$4.812	$5.263	$5.747	$5.767
Source:	*KLB-26*	*KLB-29*	*KLB-38*	*KLB-41*	*KLB-26*	*KLB-29*	*KLB-38*	*KLB-41*

Flat High Costs

	DTE Avoided Costs				DSMore Option Value			
	1.50%	**1.75%**	**2.00%**	**2.25%**	**1.50%**	**1.75%**	**2.00%**	**2.25%**
NPV Benefits (Billions $)	$4.827	$5.521	$6.305	$6.726	$6.522	$7.459	$8.519	$9.087
NPV Costs (Billions $)	$2.131	$2.439	$2.792	$3.453	$2.131	$2.439	$2.792	$3.453
BCR	2.27	2.26	2.26	1.95	3.06	3.06	3.05	2.63
NPV Net Benefits (Billions $)	$2.696	$3.082	$3.513	$3.273	$4.391	$5.020	$5.727	$5.634
Source	*KLB-24*	*KLB-27*	*KLB-36*	*KLB-39*	*KLB-24*	*KLB-27*	*KLB-36*	*KLB-39*

Flat Low Costs

	DTE Avoided Costs				DSMore Option Value			
	1.50%	**1.75%**	**2.00%**	**2.25%**	**1.50%**	**1.75%**	**2.00%**	**2.25%**
NPV Benefits (Billions $)	$4.827	$5.521	$6.305	$6.726	$6.522	$7.459	$8.519	$9.087
NPV Costs (Billions $)	$1.710	$1.953	$2.225	$2.716	$1.710	$1.953	$2.225	$2.716
BCR	2.82	2.83	2.83	2.48	3.81	3.82	3.83	3.35
NPV Net Benefits (Billions $)	$3.117	$3.568	$4.080	$4.010	$4.812	$5.506	$6.294	$6.371
Source	*KLB-25*	*KLB-28*	*KLB-37*	*KLB-40*	*KLB-25*	*KLB-28*	*KLB-37*	*KLB-40*

Q: What is the "option value" analysis?

A: As noted above, the "today" avoided costs are akin to a current "best estimate" of what future avoided costs would be. However, there is uncertainty associated with any best estimate. Avoided costs could be higher or lower than current best estimates. And there may be a different probability of them being lower than of them being higher. Further, the amount by which they could be higher than current best estimates may be greater than the amount by which they could be lower than current best estimates. Thus, rather than using a "best estimate" of avoided costs, the "option value" analysis uses a weighted average of potential future avoided costs given assumptions about the probability of different future levels of avoided costs.[44] Thus, this is a way of assessing the cost-effectiveness of efficiency in a manner that accounts for the risk associated with the uncertainty of future energy prices.

Q: Do the DSMore results you have summarized include all of the corrections to DTE's EWR assumptions that you recommended in Section III of your testimony?

A: The DSMore analyses I summarized do not have the end effects problem that DTE's Strategist analysis has. However, they are still based on average line loss rates rather than more appropriate marginal loss rates and presumably assume higher than necessary portfolio level administration costs. Moreover, they do not include any avoided T&D benefits. Put another way, they are still biased in favor of lower levels of efficiency.

Q: Do the DSMore analyses provide a helpful lens for an IRP analysis?

A: Yes. IRP analyses can *potentially* assess efficiency in a more dynamic way, accounting for such things as the impact of efficiency on power plant dispatch choices, if they are set up to

[44] DTE response to MECNRDCSC-4.24eii4.

truly optimize resource selection. However, they are not always set up to do that. In this case, for example, DTE has not let its model select different levels of energy efficiency in different years. In addition, as I previously noted, the way that DTE has modeled efficiency in Strategist has created an end effects problem that biases the analysis in favor of lower levels of efficiency. In that context, at a minimum, the DSMore results – which do not have an end effects problem and, through the "option analysis", provide a look at just the risk associated with future energy price uncertainty on EWR choices[45] – should at least be considered as a different and useful lens on the question of which level of efficiency is economically optimal.

V. Conclusions

Q: What are the implications of the problems you have identified in the way DTE has characterized and analyzed energy efficiency in its IRP?

A: DTE has mischaracterized the impact of energy efficiency in its IRP analysis. The various ways in which it has mischaracterized energy efficiency has a range of implications for interpreting the output of its IRP analyses. Among the adverse effects are:

- Biases in favor of lower levels of efficiency;
- Biases in favor of some supply resources relative to efficiency;
- Over-stating future capacity needs and/or year of needs; and

[45] DTE performed a risk assessment as part of its IRP, but it did not examine the question of risk solely from the perspective of which level of EWR made the most sense (see DTE Response to MECNRDCSC-4.14e). Instead, it assessed how different bundles of resources – combining different levels of EWR with different combinations of other resources – would be affected by uncertainties associated with different assumptions (including future energy prices).

- Changing the context in which conclusions regarding the impacts of retiring existing capacity are reached.

As Table 10 shows, some of the five different flaws in the Company's analysis of efficiency that I have examined would lead to just two of these adverse effects; others could lead to more than two.

Table 10: Adverse Effects of DTE Efficiency Analysis Flaws

Flaw in DTE IRP Analysis of Efficiency	Bias in Favor of Lower Levels of Efficiency	Bias in Favor of Some Supply Resources	Over-Stating Future Capacity Needs	Changing Context for Analysis of Effects of Capacity Retirement
No adjustment for end effects	X	X		
Over-estimate of administrative costs	X	X		
Use of average rather than marginal line loss rates	X	X	X	X
Over-estimate of efficiency embedded in forecast			X	X
Not optimizing efficiency program/measure costs	X	X		

My testimony focuses primarily on the first of these adverse effects – biasing the IRP analysis in favor of lower levels of efficiency. Mr. Evans addresses the others in his testimony.

Q: What did DTE conclude as a result of its analytical biases in favor of lower levels of efficiency?

A: DTE concludes that the 1.50% EWR savings level is the least cost efficiency savings option when it analyzes efficiency in its Reference Scenario using EWR tiered costs – the scenario that best represents the Company's view of key IRP assumptions. The Company acknowledges that higher levels of EWR are selected as "least cost" under different assumptions – *e.g.*, 2.00% EWR under the Business as Usual (BAU) and Emerging Technology (ET) scenarios, and 1.75% EWR under the Environmental Policy (EP) scenario.

The Company did not find either the 2.25% or 2.50% EWR savings levels to be optimal under any scenarios.

Q: Would those conclusions have changed if the biases in its analyses were corrected?

A: Yes. As Table 11 shows, when the biases are corrected, the 2.00% EWR savings level is the economically optimal level in each of the four different Scenarios analyzed by DTE, as well as in the EWR Flat High Cost sensitivity run on the Reference Scenario. In addition, though it is not the least cost option in any Scenario, the 2.25% EWR savings level is always lower cost than 1.50% and is the second most cost-effective savings level – after 2.00% EWR – in two of the five cases (BAU and ET).

Table 11: Corrected NPVRR Across Multiple Scenarios (millions $)[46]

	Total				Incremental to 1.50%			
Scenarios	**1.50%**	**1.75%**	**2.00%**	**2.25%**	**1.50%**	**1.75%**	**2.00%**	**2.25%**
DTE Analyses (including Avoided T&D)								
Reference	$13,206	$13,211	$13,270	$13,532	$0	$5	$64	$326
Reference w/EWR Flat High Costs	$13,562	$13,417	$13,288	$13,624	$0	($145)	($274)	$62
Business as Usual	$12,615	$12,448	$12,286	$12,606	$0	($167)	($329)	($9)
Environmental Policy	$12,328	$12,218	$12,247	$12,664	$0	($110)	($81)	$336
Emerging Technology	$12,168	$11,964	$11,785	$11,974	$0	($204)	($383)	($194)
Corrected Analyses (End Effects, Admin $ and Marginal Line Losses)								
Reference	$12,340	$12,228	$12,121	$12,323	$0	($112)	($220)	($17)
Reference w/EWR Flat High Costs	$12,696	$12,466	$12,209	$12,487	$0	($230)	($487)	($210)
Business as Usual	$11,749	$11,497	$11,207	$11,468	$0	($252)	($542)	($281)
Environmental Policy	$11,462	$11,267	$11,168	$11,526	$0	($195)	($294)	$64
Emerging Technology	$11,302	$11,013	$10,707	$10,851	$0	($290)	($595)	($451)

[46] The value of avoided T&D costs is included in all of the values in the table, both DTE's and the corrected analyses. Note that the impacts of using marginal (rather than average) line losses to convert customer energy savings to generation savings were estimated using the Strategist model only for the Reference Scenario. The NPVRR values shown for the corrected analyses in other scenarios assume that the difference in benefits found in Strategist modelling for the Reference Scenario would also be realized in those scenarios (*i.e.*, $9 million NPVRR reduction for 1.50% EWR, $23 million NPVRR reduction for 1.75% EWR, $38 million NPVRR reduction for 2.00% EWR and $47 million NPVRR reduction for 2.25% EWR).

Furthermore, as discussed in section IV of my testimony, these corrected results – showing 2.00% EWR to be the economically optimal efficiency investment level – are consistent with the Company's own DSMore cost-effectiveness analyses.

Q: Do you have any recommendations for the Michigan Public Service Commission as a result of your analyses?

A: Yes. I recommend that the Commission find DTE's analysis of energy efficiency seriously deficient. First, with no less than the 2.00% EWR savings level being least cost under all scenarios once DTE's analyses are corrected, DTE should ramp its efficiency plan savings to 1.75% in 2020 and 2.00% in 2021 and through at least the defined PCA period. That is consistent with what Consumers Energy has proposed in its recently-filed 2020-2023 EWR plan.[47]

Second, I recommend that the Commission instruct DTE to correct for the flaws I have identified in all future IRPs.

Q: Does this conclude your testimony?

A: Yes.

[47] Actually, Consumers has proposed to ramp up to 1.9% savings in 2020 and 2.2% savings each year from 2021 through 2023 (see Ex A-2 (TAY 2) filed in Michigan Public Service Commission Case No. U-20372).

CHRISTOPHER NEME, PRINCIPAL

EDUCATION

M.P.P., University of Michigan, 1986
B.A.., Political Science, University of Michigan, 1985

EXPERIENCE

2010-present: Principal (and Co-Founder), Energy Futures Group, Hinesburg, VT
1999-2010: Director of Planning & Evaluation, Vermont Energy Investment Corp., Burlington, VT
1993-1999: Senior Analyst, Vermont Energy Investment Corp., Burlington, VT
1992-1993: Energy Consultant, Lawrence Berkeley National Laboratory, Gaborone, Botswana
1986-1991: Senior Policy Analyst, Center for Clean Air Policy, Washington, DC

PROFESSIONAL SUMMARY

Chris specializes in analysis of markets for energy efficiency, renewable energy and strategic electrification measures and the design and evaluation of programs and policies to promote them. During his 25+ years in the clean energy industry, Mr. Neme has worked for energy regulators, utilities, government agencies and advocacy organizations in 30 states, 6 Canadian provinces and several European countries. He has defended expert witness testimony before regulatory commissions in ten different jurisdictions; he has also testified before several state legislatures.

SELECTED PROJECTS

- ***Natural Resources Defense Council (Midwest).*** Critically review efficiency plans, distribution system plans, and demand response plans filed by Illinois, Michigan and/or Ohio utilities. Draft and defend regulatory testimony on critiques. Represent NRDC in stakeholder-utility processes governing plan and goal development and related policies. Provide technical support to collaborative efforts with utilities to design and launch non-wires alternative pilot projects. Supported development of Illinois Future Energy Jobs Act. (2010 to present)
- ***New Jersey Board of Public Utilities.*** Serve on management team responsible for statewide delivery of New Jersey Clean Energy Programs. Lead strategic planning; support regulatory filings, cost-effectiveness analysis & evaluation work. (2015 to present) Served on management team for start-up of residential and renewables programs for predecessor project. (2006-2010)
- ***E4TheFuture.*** Co-Authored 2017 National Standard Practice Manual for assessing cost-effectiveness of energy efficiency and other distributed resources. Assisting state regulators and others in understanding and applying the Manual. (2016-present)
- ***Regulatory Assistance Project - U.S.*** Provide guidance on efficiency policy and programs. Lead author on strategic reports on achieving 30% electricity savings in 10 years, using efficiency to defer T&D system investments, & bidding efficiency into capacity markets. (2010 to present)
- ***Ontario Energy Board:*** Serve on provincial gas DSM Evaluation Committee, advisory committee on gas efficiency potential study and advisory committee on carbon price forecast. (2015-present) Served on predecessor utility-stakeholder evaluation committees. (2000 to 2015)

CHRISTOPHER NEME, PRINCIPAL

- *Green Energy Coalition (Ontario).* Represent coalition of environmental groups in regulatory proceedings, utility negotiations and stakeholder meetings on DSM policies (including integrated resource planning on pipeline expansions) and utility proposed DSM Plans. (1993 to present)
- *New Hampshire Consumer Advocate.* Filed expert witness testimony on the merits of including a non-wires alternative pilot project in the state's efficiency program plans. (2018)
- *Southern Environmental Law Center.* Critically reviewed and filed expert witness testimony on Duke Energy efficiency program plans and past year savings claims. (2018)
- *Green Mountain Power (Vermont).* Support development and implementation of GMP's compliance plan for Vermont RPS Tier 3 requirement to reduce customers' direct consumption of fossil fuels, with significant emphasis on strategic electrification strategies. Also led development of forecast of strategic electrification potential. (2016 to 2018)
- **Toronto Atmospheric Fund.** Helped draft an assessment of efficiency potential from retrofitting of heat pumps into electrically heated multi-family buildings (2017).
- *Regulatory Assistance Project - Europe.* Provide on-going support on efficiency policies and programs in the United Kingdom, Germany, and other countries. Reviewed draft European Union policies on Energy Savings Obligations, EM&V protocols, and related issues. Drafted policy brief on efficiency feed-in-tariffs and roadmap for residential retrofits. (2009 to 2017)
- *Northeast Energy Efficiency Partnerships.* Helped manage Regional EM&V forum project estimating savings for emerging technologies, including field study of cold climate heat pumps. Led assessment of best practices on use of efficiency to defer T&D investment. (2009 to 2015)
- *Ontario Power Authority.* Managed jurisdictional scans on leveraging building efficiency labeling/disclosure requirements and non-energy benefits in cost-effectiveness screening. Supported staff workshop on the role efficiency can play in deferring T&D investments. Presented on efficiency trends for Advisory Council on Energy Efficiency. (2012-2015)
- *New Hampshire Electric Co-op.* Led assessment of the co-op's whole building efficiency retrofit, cold climate heat pump and renewable energy programs. (2014)
- *National Association of Regulatory Utility Commissioners (NARUC) and Michigan Public Service Commission.* Assessed alternatives to first year savings goals to eliminate disincentives to invest in longer-lived measures and programs. (2013)
- *New York State Energy Research and Development Authority (NYSERDA).* Led residential & renewables portions of several statewide efficiency potential studies. (2001 to 2010)
- *Ohio Public Utilities Commission.* Senior Advisor developing a new TRM. (2009 to 2010)
- *Vermont Electric Power Company.* Led residential portion of efficiency potential study to assess alternatives to new transmission line. Testified before Public Service Board. (2001-2003)
- *Efficiency Vermont.* Served on Sr. Management team. Supported initial project start-up. Oversaw residential planning, input to regulators on evaluation, input to regional EM&V forum, development of M&V plan and other aspects of bidding efficiency into New England's Forward Capacity Market (FCM), and development and updating of nation's first TRM. (2000 to 2010)

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23a
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are “Savings Targets” for each sector. The values for those targets are hard-wired.

a. Please explain how those values are used by DTE in its IRP analyses. Do they dictate the level of savings by sector that are included in each of the different EWR total savings levels analyzed by DTE?

Answer: Yes. These were the Residential and C&I first year savings target calculated for each sector, by year, included in each of the EWR savings levels analyzed. The Residential and C&I savings target was based on the split between the Residential and C&I net potential identified in the GDS Potential Study.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23b
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are “Savings Targets” for each sector. The values for those targets are hard-wired.

b. Please explain how those values were derived.

Answer: These values correspond to the values in Cells N4:AI5 of the “EWR by Year” worksheets. Calculations were provided in the “EWR by Year” worksheets to determine how the values were derived.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23c
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are “Savings Targets” for each sector. The values for those targets are hard-wired.

c. Please explain how DTE determined how much of the total savings for a given EWR level (e.g. 1.50%, 1.75%, 2.00%, etc.) should be residential versus C&I.

Answer: The Residential and C&I savings targets were based on the split between the Residential and C&I net potential identified in the GDS Potential Study. Please refer to WP KLB-1 through WP KLB-21 for the net potential. The total net potential savings for Residential are on the “Residential Model” worksheet, column I, rows 46 through 221. The total net potential savings for C&I are on the “C&I Model” worksheet, column I, rows 51 through 336.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23d.i
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are "Savings Targets" for each sector. The values for those targets are hard-wired.

d. With respect to the economics of the allocation of savings targets between the residential and C&I sectors:

i. Would it be possible to lower the total cost of acquisition of EWR savings for any of the EWR savings levels by reducing the residential savings target and increasing the C&I target by the same amount (or vice versa) – i.e. by economically optimizing the EWR program portfolio without regard for resulting sector allocations?

Answer: The EWR levels were optimized for cost-effectiveness as described in the direct testimony of Witness K. L. Bilyeu, starting on Page KLB-11, Line 21. An optimization without any regard to sector allocations has not been performed.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23d.ii
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are “Savings Targets” for each sector. The values for those targets are hard-wired

.

d. With respect to the economics of the allocation of savings targets between the residential and C&I sectors:

ii. If so, by how much could the total cost of any of the EWR savings levels be lowered by economically optimizing the allocation of savings levels by sector? Please show all calculations used to support your response on this question.

Answer: Please see the response to MECNRDCSCDE-8-23di.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23d.iii.1
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are "Savings Targets" for each sector. The values for those targets are hard-wired.

d. With respect to the economics of the allocation of savings targets between the residential and C&I sectors:

iii. Did DTE analyze any different allocations of savings by sector other than those ultimately used in its IRP?

1. If so, please provide the different allocations analyzed, the impacts of such different allocations on total EWR costs for each EWR level analyzed.

Answer: No, DTE did not analyze savings by different sector allocations other than those included in its IRP.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23d.iii.2
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are "Savings Targets" for each sector. The values for those targets are hard-wired.

d. With respect to the economics of the allocation of savings targets between the residential and C&I sectors:

iii. Did DTE analyze any different allocations of savings by sector other than those ultimately used in its IRP?

2. Also, please explain why the allocations ultimately used by DTE in developing its IRP assumptions were preferred and used.

Answer: The split between Residential and C&I was based on the net potential from the GDS potential study (consistent with how the data was provided from GDS and how the data is provided in the Company's approved EWR filings). This is important since it captures the trends between Residential and C&I identified in the potential study and allows the model the select up to 100% of the available potential. This approach ensures each EWR level is modeled consistently and optimized for cost-effectiveness.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23e
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are “Savings Targets” for each sector. The values for those targets are hard-wired.

e. Please provide all the calculations showing how the savings target values used in DTE’s IRP analyses were derived (in Excel with formulae intact).

Answer: Please see response to MECNRDCSCDE-8.23b.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.23f
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his workpapers KLB-1 through KLB-21, on Row 15 of the Residential Model tabs and Row 20 of the C&I Model tabs, there are "Savings Targets" for each sector. The values for those targets are hard-wired.

f. For each of the EWR levels analyzed for the IRP (i.e. 1.50%, 1.75%, 2.00%, 2.25% and 2.50%), please provide the savings targets by sector as a percent of the cost-effective savings potential estimated by GDS (e.g. residential savings target divided by total savings potential and C&I savings target divided by total C&I savings potential) for each year from 2019 through 2040.

Answer: Please refer to WP KLB-1 through WP KLB-21. The total net potential savings for Residential are on the "Residential Model" worksheet, column I, rows 46 through 221. The total net potential savings for C&I are on the "C&I Model" worksheet, column I, rows 51 through 336. The sector savings targets can be divided by the net potential savings to calculate the savings targets as a percent of total net potential savings.

Attachments: All non-confidential workpapers were included on the discs that were provided to parties at the pre-hearing conference on April 26, 2019. In addition, the workpapers can be accessed at the following hyperlink under MECNRDCSCDE-1:
https://dteenergy.sharepoint.com/sites/DiscoveryPortal/Elec/U-204712019IRPPublic/default.aspx

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.21
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: In his response to MECNRDCSCDE-4.24eii4, Mr. Bilyeu describes what DSMore's "market-based option" scenario for assessing cost-effectiveness of efficiency resources means. However, the response does not address the second part of the request, which asks why DTE does not use that DSMore output. Please explain why DTE uses DSMore's "market-based today" scenario rather than its "market-based option" scenario as its preferred set of outputs for estimates of efficiency cost-effectiveness.

Answer: DSMore was developed to show the distribution of potential cost benefit scores based on various hourly prices, weather and load scenarios. It provides multiple scores that show the distribution of results from the minimum prices with the mildest weather, to the highest prices under the most extreme weather. The market based "today's" value was selected because it is based on DTE's current average energy prices and most closely reflects the prices in the current forecast.

Attachments: N/A

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-7.69a
Respondent:	L. K. Mikulan
Page:	1 of 1

Question: In response to MEC 4.3c, Ms. Mikulan states that "no projected impacts from EWR programs beyond the study end year 2040 were included in the optimization." She goes on to suggest that because "costs or savings from any other energy and/or capacity resource option beyond the year 2040 were (similarly) not included…the treatment of all options, whether demand or supply side, is equivalent."

a. Putting aside the question of whether other options are treated equivalently, would Ms. Mikulan agree that this approach includes all the costs of efficiency programs run through 2040, but not all of the benefits of such programs (because many if not most efficiency measures installed in the 2030s, and even some of the measures installed in the 2020s, will provide savings in the 2040s, with some savings extending into the 2050s and 2060s)? If not, why not?

Answer: All costs associated with EWR programs are included through 2040, as are all benefits. It is not necessary to include all benefits or costs from beyond 2040 to properly assess the cost effectiveness of programs that are installed in the early years of the analysis. To include costs or benefits that extend that far into the future does not change the decisions made for programs installed in the early 2020s. Programs installed after the midpoint of the 2020s are, and should always be considered to be, placeholders for potential EWR programs whose full cost effectiveness across the study period will be determined when a commitment to implementing such EWR programs will be made.

Attachments: *N/A*

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-7.69bi
Respondent: L. K. Mikulan
Page: 1 of 1

Question: In response to MEC 4.3c, Ms. Mikulan states that "no projected impacts from EWR programs beyond the study end year 2040 were included in the optimization." She goes on to suggest that because "costs or savings from any other energy and/or capacity resource option beyond the year 2040 were (similarly) not included…the treatment of all options, whether demand or supply side, is equivalent."

b. With respect to whether all resources are treated equivalently:

i. Confirm that per DTE's response to MEC 3.54 suggests that the entire capital cost of a new gas power plant that is installed in the 2030s is included in DTE's IRP modeling? If not confirmed, please explain what portion of such capital costs are included.

Answer: Assuming that by entire capital cost of a new gas power plant means entire installed project capital costs, as described in response MECNRDCSCDE-3.54, then yes, capital costs were only included for the portion of the resource's lifetime that is within the study period.

The Strategist model used for the analysis employs an Economic Carrying Charge (ECC) to allocate an appropriate amount of the new plant capital cost to that time period within the study period where the unit was in service. The ECC is also called the Value of Deferral because it is based on the difference between the full Present Value Revenue Requirements (PVRR) of capital cost for the initial lifetime of the resource plus all future replacements in kind, minus the PVRR of that resource built in the following year. This value can be thus thought of as an appropriate "rental payment" for that resource for each year the resource is in service during the study period. This value escalates year on year at the construction escalation rate for the resource. The present value of the ECC, is exactly equal to the present value of the annual revenue requirements and is exactly equal to the present value of a levelized capital cost stream, when all three are computed for whole lifetimes of the resource.

Attachments: *n/a*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-7.69bii
Respondent:	L. K. Mikulan
Page:	1 of 1

Question: In response to MEC 4.3c, Ms. Mikulan states that "no projected impacts from EWR programs beyond the study end year 2040 were included in the optimization." She goes on to suggest that because "costs or savings from any other energy and/or capacity resource option beyond the year 2040 were (similarly) not included…the treatment of all options, whether demand or supply side, is equivalent."

b. With respect to whether all resources are treated equivalently:

ii. Is the entire operating cost – including fuel costs – over the entire life of a gas-fired power plant that is installed in the 2030s included in DTE's IRP modeling? If so, how is that done? If not, is it only the operating and fuel costs that would be incurred through 2040 that are included in IRP modeling?

Answer: Only operating costs incurred during the study period were included in the IRP modeling, and only benefits accrued through 2040 were included.

Attachments: *N/A*

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-7.69biii
Respondent: L. K. Mikulan
Page: 1 of 1

Question: In response to MEC 4.3c, Ms. Mikulan states that "no projected impacts from EWR programs beyond the study end year 2040 were included in the optimization." She goes on to suggest that because "costs or savings from any other energy and/or capacity resource option beyond the year 2040 were (similarly) not included…the treatment of all options, whether demand or supply side, is equivalent."

b. With respect to whether all resources are treated equivalently:

iii. Wouldn't DTE's approach to IRP modeling (i.e. of excluding and not adjusting for post-2040 impacts of resources) be a bias in favor of resources for which operating and/or fuel costs represent the majority of their lifecycle costs relative to resources, like efficiency, for which all costs are up-front costs and would therefore be captured in their entirety when making resource choices to meet needs pre-2040? If not, why not?

Answer: No, the inclusion of costs and benefits that only occur within the study period does not introduce a bias against resources, such as EWR, whose benefits extend beyond the study period, i.e., post 2040. This is because the Strategist model used in the analysis is an Economic Analysis and decision model, and all costs and benefits incorporated in the optimization objective function in present value terms. This approach automatically discounts the impacts of decisions made late in the analysis. Strategist also applies the same end point cutoff for generation resources, so any generation built or contracted late in the study period also does not consider the costs and potential benefits beyond the 2040 end year of the analysis.

Attachments: *N/A*

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-7.69biv
Respondent: L. K. Mikulan/Legal
Page: 1 of 2

Question: In response to MEC 4.3c, Ms. Mikulan states that "no projected impacts from EWR programs beyond the study end year 2040 were included in the optimization." She goes on to suggest that because "costs or savings from any other energy and/or capacity resource option beyond the year 2040 were (similarly) not included…the treatment of all options, whether demand or supply side, is equivalent."

b. With respect to whether all resources are treated equivalently:

iv. Consider a hypothetical scenario in IRP modeling in which the model faced a choice between (1) a new power purchase of 100 GWh for $5 million total cost (5 cents/kWh) to meet a need in 2040, or cx(2) the launch of a new set of efficiency programs in 2040 that would provide the same 100 GWh of savings at a cost of $20 million (20 cents per first year kWh) but at a levelized cost over an average 10 year life of the savings of 2.5 cents per kWh (assuming a real discount rate of about 4.5%). In this case, wouldn't DTE's IRP model select the resource with the lowest cost through 2040 (i.e. the power purchase) rather than the resource (i.e. efficiency) with the much lower lifecycle cost? If not, why not?

Answer: DTE Electric objects to the hypothetical for the reason that it doesn't seek relevant evidence and does not fairly represent all aspects of the decision-making process. The hypothetical cannot fairly be answered because the model takes into account many variable factors in making a decision, and inputs for those variables are not provided. Furthermore, the question presumes the model is actually selecting something to be built, which it is not during the flexible period of the PCA.

Subject to this objection, and without waiving this objection, the Company would answer as follows:

This IRP is not making firm decisions about resources to be in service in 2040. The proposed course of action represents placeholders for resources for that timeframe, which will actually be selected at a later point

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-7.69biv
Respondent: L. K. Mikulan/Legal
Page: 2 of 2

in time. In addition to the modeling, the Company considered multiple factors and used the planning principles in developing its proposed course of action within this IRP. To imply that any resource selected in this IRP analysis for the flexible PCA time frame represents a firm resource selection that the Company is committed to building or acquiring ignores the very nature of the IRP process. That is: this is a constantly moving target and the IRP plan will be adjusted as future conditions, goals, policies, availability, costs and operating characteristics of future resources including EWR and renewables, generation, and the forecasts of what the costs and customer demand will be for those future years change. DTE Electric maintains that the consistent use of a model like Strategist, which treats all resources equally, is both the fairest and least potentially biased way to create future resource plans.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.23a
Respondent:	L. K. Mikulan
Page:	1 of 1

Question: In Bilyeu Exhibit A-21, incremental MWh, cumulative MWh, cumulative MW capacity savings, annual capital costs, annual O&M cost, financial performance incentive and total annual cost are provided for each level of EWR analyzed for the years 2019 through 2040.

a. Were the savings and costs for each of those years, as shown in the Exhibit, used in the Company's IRP modeling?

Answer: Yes, the savings and costs as described were used in the Company's modeling.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.23b
Respondent:	L. K. Mikulan
Page:	1 of 1

Question: In Bilyeu Exhibit A-21, incremental MWh, cumulative MWh, cumulative MW capacity savings, annual capital costs, annual O&M cost, financial performance incentive and total annual cost are provided for each level of EWR analyzed for the years 2019 through 2040.

b. Were cumulative energy savings or cumulative capacity savings in years after 2040 included in the Company's IRP modeling? If so, please provide the values included in the IRP modeling for those post-2040 years.

Answer: No.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.23c
Respondent:	L. K. Mikulan
Page:	1 of 1

Question: In Bilyeu Exhibit A-21, incremental MWh, cumulative MWh, cumulative MW capacity savings, annual capital costs, annual O&M cost, financial performance incentive and total annual cost are provided for each level of EWR analyzed for the years 2019 through 2040.

c. If the Company's IRP modeling included all costs through 2040 but excluded savings that would persist in years post-2040 (i.e. if the answer to part "b" of this question is "no"), please explain why it is appropriate to include costs that are incurred, for example, in 2040 to promote measures that could provide savings through 2060 or even beyond but not include those post-2040 savings in the IRP analyses?

Answer: The IRP analysis was conducted through 2040. No costs or savings from any other energy and/or capacity resource option beyond the year 2040 was included. Therefore, the treatment of all options, whether demand side or supply side in the optimization, is equivalent.

Attachments: *N/A*

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-4.23d
Respondent: K. L. Bilyeu
Page: 1 of 2

Question: In Bilyeu Exhibit A-21, incremental MWh, cumulative MWh, cumulative MW capacity savings, annual capital costs, annual O&M cost, financial performance incentive and total annual cost are provided for each level of EWR analyzed for the years 2019 through 2040.

d. Please show all computations used to derive each of the values provided in this Exhibit.

Answer: Please refer to the following workpapers for incremental MWh savings, annual capital costs, annual O&M costs, financial performance incentive, and total annual costs:

- KLB-1 EWR Model 1.50%_Tiered Costs
- KLB-9 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Tiered Costs
- KLB-12 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Tiered Costs
- KLB-13 EWR Model 2.00%_Tiered Costs
- KLB-18 EWR Model 2.25%_Tiered Costs
- KLB-20 EWR Model 2.50% Tiered Costs

Please refer to the following workpapers for cumulative MWh savings and cumulative MW savings:

- KLB-26 EWR DSMore Aggregation 1.50% _Tiered Costs
- KLB-32 EWR DSMore Aggregation 1.75% Defined PCA_1.75% Flexible PCA_Tiered Costs
- KLB-35 EWR DSMore Aggregation 1.75% Defined PCA_2.00% Flexible PCA_Tiered Costs
- KLB-38 EWR DSMore Aggregation 2.00% _Tiered Costs
- KLB-41 EWR DSMore Aggregation 2.25% _Tiered Costs
- KLB-44 EWR DSMore Aggregation 2.50% _Tiered Costs

Cumulative MWh savings are aggregated using DSMore and is the sum of columns B through W (each column represents a separate year with “Year 1” being 2019) of the “kWh Savings 8760” worksheet in the above reference workpapers.

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.23d
Respondent:	K. L. Bilyeu
Page:	2 of 2

Cumulative MW savings are aggregated using DSMore and is included on MM 07 HH 16 of columns AC through AX (each column represents a separate year with "Year 1" being 2019) of the "kWh Savings 8760" worksheet in the above reference workpapers.

These values are used by the IRP team to calculate MW savings which is included on workpaper "LKM-463 EWR Cost_Benefit Analysis.xlsx"

Attachments: All non-confidential workpapers were included on the discs that were provided to parties at the pre-hearing conference on April 26, 2019. In addition, the workpapers can be accessed at the following hyperlink under MECNRDCSCDE-1: https://dteenergy.sharepoint.com/sites/DiscoveryPortal/Elec/U-204712019IRPPublic/default.aspx

DTE Electric Company

WP KLB-1 EWR Model 1.50%_Tiered Costs: Output

Case No: U-20471
Workpaper: KLB-1
Page: 1 of 2
Witness: K. L. Bilyeu

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**182,911**	**166,123**	**152,514**	**159,187**	**182,860**	**204,862**	**208,039**	**205,712**	**222,474**	**218,292**	**201,006**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	18,291	29,251	36,896	37,896	38,981	40,199	41,642	43,032	44,332	21,829	26,348
Electronics	27,392	19,865	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,286	2,077	15,374	14,642	19,777	22,032	23,584	4,691	23,289	21,518	28,080
HVAC Shell	3,225	1,829	1,661	1,525	1,592	1,829	2,049	2,080	2,057	2,225	2,183	2,010
HVAC Equipment	17,476	13,718	12,459	12,986	11,939	18,561	23,510	15,603	15,428	16,686	16,372	17,761
Miscellaneous	560	457	415	856	398	1,028	1,122	520	514	556	546	1,526
Cross-Cutting	54,316	32,924	24,918	22,877	23,878	27,429	30,729	31,206	30,857	33,371	32,744	30,151
Commerical & Industrial	**387,974**	**461,890**	**478,941**	**493,576**	**485,869**	**461,526**	**438,791**	**435,253**	**437,388**	**420,470**	**424,541**	**441,756**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	158,025	152,435	138,096	152,637	160,805
Refrigeration	18,817	74,596	79,560	83,508	54,828	34,081	28,614	21,110	21,213	20,393	20,590	23,215
HVAC	31,038	36,951	38,315	39,486	38,869	36,922	35,103	34,820	34,991	33,638	33,963	35,341
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,215	1,154	1,097	1,088	1,093	1,051	2,941	2,937
Ventilation	7,759	9,238	9,579	9,872	9,717	9,231	8,776	8,705	8,748	8,409	8,491	8,835
Cooking	1,940	2,309	2,395	2,468	2,429	2,308	2,194	2,176	2,187	2,102	2,123	2,209
Pools	970	1,155	1,197	1,234	1,215	1,154	1,097	1,088	1,093	904	1,061	1,104
Other	970	1,155	1,197	1,234	1,215	1,154	1,097	1,088	1,093	1,051	1,061	1,104
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	10,881	10,935	10,512	10,614	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**644,800**	**645,064**	**646,091**	**645,056**	**644,387**	**643,654**	**643,291**	**643,100**	**642,944**	**642,833**	**642,763**
Pilots	35,143	35,043	35,058	35,114	35,057	35,021	34,981	34,961	34,951	34,943	34,937	34,933
Education	21,086	21,026	21,035	21,068	21,034	21,013	20,989	20,977	20,971	20,966	20,962	20,960
Total Savings	**702,851**	**700,870**	**701,156**	**702,273**	**701,147**	**700,420**	**699,624**	**699,230**	**699,022**	**698,853**	**698,732**	**698,655**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$27,500,503**	**$28,504,223**	**$30,557,217**	**$31,410,856**	**$36,844,356**	**$41,337,197**	**$41,129,524**	**$39,418,143**	**$44,963,728**	**$46,775,580**	**$43,561,966**
Lighting	15,192,489	12,136,533	8,828,801	4,737,578	4,719,635	4,709,323	4,710,094	4,736,136	4,750,607	2,467,314	2,250,566	2,148,004
Appliances	7,176,137	4,020,424	6,499,225	8,216,553	8,482,714	8,781,986	9,129,516	9,560,221	9,979,049	10,332,968	6,493,720	7,980,316
Electronics	3,741,531	2,752,535	5,758,710	6,550,910	7,561,206	8,551,149	9,949,215	11,174,210	14,261,053	15,548,181	21,907,812	14,808,675
Water Heating	1,979,097	594,359	546,281	4,080,856	3,926,982	5,364,165	6,048,965	6,563,487	1,323,702	6,659,541	6,179,754	8,160,711
HVAC Shell	1,153,480	652,861	594,953	548,815	576,448	667,064	753,427	772,079	770,816	841,801	840,112	785,164
HVAC Equipment	5,124,891	4,057,556	3,711,098	3,877,737	3,580,115	5,593,593	7,127,238	4,765,933	4,746,612	5,159,386	5,148,194	5,648,638
Miscellaneous	161,295	132,631	121,382	251,965	117,996	307,029	337,227	157,369	156,650	170,563	168,511	474,376
Cross-Cutting	5,071,274	3,153,604	2,443,772	2,292,803	2,445,760	2,870,049	3,281,515	3,400,090	3,429,653	3,783,973	3,786,911	3,556,081
Commerical & Industrial	**$58,998,406**	**$68,903,212**	**$70,917,774**	**$72,689,844**	**$69,093,114**	**$59,385,999**	**$56,092,588**	**$55,549,582**	**$57,102,929**	**$55,011,866**	**$52,158,047**	**$55,055,557**
Lighting	30,093,471	30,220,735	30,402,809	30,524,357	27,858,058	21,686,632	20,200,769	20,946,474	21,732,060	20,981,008	17,687,868	18,319,364
Office Equipment	8,632,730	8,745,871	8,857,263	8,964,415	12,718,277	13,129,310	12,285,094	12,260,170	12,870,779	11,732,247	12,147,304	13,105,369
Refrigeration	2,290,235	9,150,252	9,833,748	10,396,885	5,743,474	3,469,232	2,888,450	2,367,464	2,117,443	2,138,061	2,139,775	2,384,005
HVAC	9,320,249	11,131,082	11,577,897	11,967,360	12,060,275	10,783,610	10,419,101	9,413,749	9,487,747	9,253,477	8,922,881	9,562,801
Compressed Air	2,139,099	2,589,147	2,954,135	3,331,819	3,386,019	3,003,539	2,992,038	3,166,419	3,345,910	3,391,118	3,248,480	3,297,582
Water Heating	376,110	379,579	382,993	386,278	131,113	129,581	126,764	127,691	129,250	127,816	209,939	212,296
Ventilation	1,055,856	1,265,806	1,321,508	1,370,786	1,359,604	1,304,897	1,250,319	1,243,402	1,256,956	1,216,923	1,303,804	1,365,273
Cooking	529,885	633,035	658,648	680,999	672,497	640,817	611,105	608,011	612,857	590,981	598,594	696,108
Pools	179,302	214,560	223,603	231,548	229,400	220,691	211,890	211,099	213,066	177,857	339,373	354,136
Other	421,161	502,498	522,170	539,239	523,723	436,933	407,857	405,485	408,406	388,121	332,481	346,965
Machine Drive	2,915,557	3,014,895	3,116,417	3,219,158	3,323,522	3,483,522	3,592,188	3,703,200	3,817,170	3,934,563	4,112,498	4,237,831
Process Cooling & Heating	1,000,425	1,010,980	1,021,371	1,031,366	1,041,106	1,050,777	1,060,157	1,049,169	1,063,635	1,031,638	1,051,064	1,109,343
Agriculture	44,326	44,773	45,212	45,635	46,046	46,458	46,854	47,250	47,649	48,057	63,986	64,486
Overall Program (Res + C&I)	**$98,598,600**	**$96,403,715**	**$99,421,997**	**$103,247,060**	**$100,503,970**	**$96,230,355**	**$97,429,786**	**$96,679,106**	**$96,521,071**	**$99,975,594**	**$98,933,626**	**$98,617,523**
Pilots	5,666,586	5,540,443	5,713,908	5,933,739	5,776,090	5,530,480	5,599,413	5,556,270	5,547,188	5,745,724	5,685,841	5,667,674
Education	3,399,952	3,324,266	3,428,345	3,560,243	3,465,654	3,318,288	3,359,648	3,333,762	3,328,313	3,447,434	3,411,504	3,400,604
EM&V	5,666,586	5,540,443	5,713,908	5,933,739	5,776,090	5,530,480	5,599,413	5,556,270	5,547,188	5,745,724	5,685,841	5,667,674
Performance Incentive	22,666,345	22,161,774	22,855,631	23,734,956	23,104,361	22,121,921	22,397,652	22,225,082	22,188,752	22,982,895	22,743,362	22,670,695
Total Spend	**$135,998,068**	**$132,970,641**	**$137,133,789**	**$142,409,738**	**$138,626,166**	**$132,731,524**	**$134,385,911**	**$133,350,491**	**$133,132,512**	**$137,897,371**	**$136,460,174**	**$136,024,170**

DTE Electric Company

WP KLB-1 EWR Model 1.50%_Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
163,223	**166,440**	**166,621**	**150,550**	**145,691**	**154,443**	**170,313**	**162,663**	**162,644**	**162,631**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
16,322	16,644	16,662	15,055	14,569	15,444	17,031	16,266	16,264	16,263
88,809	88,894	89,506	78,726	75,561	81,424	92,376	87,512	87,500	87,492
13,609	15,908	15,674	1,882	1,821	1,931	2,129	2,033	2,033	2,033
1,632	1,664	1,666	1,506	1,457	1,544	1,703	1,627	1,626	1,626
12,242	12,483	12,497	11,291	10,927	11,583	12,773	12,200	12,198	12,197
408	416	417	376	364	386	426	407	407	407
24,484	24,966	24,993	22,583	21,854	23,166	25,547	24,399	24,397	24,395
479,533	**476,230**	**475,988**	**491,965**	**496,667**	**487,790**	**471,749**	**479,278**	**479,223**	**479,184**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
95,708	87,896	82,776	48,010	54,934	73,556	53,155	59,560	59,515	59,483
23,257	23,097	23,085	23,860	24,088	23,658	22,880	23,245	23,242	23,240
38,363	38,098	38,079	39,357	39,733	39,023	37,740	38,342	38,338	38,335
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,230	1,242	1,219	1,179	1,198	1,198	1,198
9,591	9,525	9,520	9,839	9,933	9,756	9,435	9,586	9,584	9,584
2,398	2,381	2,380	2,460	2,483	2,439	2,359	2,396	2,396	2,396
1,199	1,191	1,190	1,230	1,242	1,219	1,134	1,050	1,050	1,050
1,199	1,191	1,190	1,230	1,242	1,219	1,179	1,198	1,198	1,198
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	12,299	12,417	12,195	11,794	11,982	11,981	11,980
551	551	551	738	745	732	708	719	719	719
642,756	**642,670**	**642,610**	**642,515**	**642,358**	**642,233**	**642,062**	**641,941**	**641,867**	**641,815**
34,932	34,928	34,924	34,919	34,911	34,904	34,895	34,888	34,884	34,881
20,959	20,957	20,955	20,952	20,946	20,942	20,937	20,933	20,930	20,929
698,648	**698,554**	**698,489**	**698,386**	**698,215**	**698,079**	**697,894**	**697,762**	**697,682**	**697,625**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$32,726,886	**$33,918,705**	**$34,476,960**	**$29,876,134**	**$29,993,043**	**$32,346,994**	**$37,678,679**	**$34,282,082**	**$34,698,868**	**$35,125,431**
2,180,395	2,117,880	2,054,599	4,157,152	4,125,225	4,065,705	3,936,440	3,886,772	3,933,895	3,981,991
5,012,589	5,180,283	5,319,918	4,910,413	4,849,506	5,226,161	5,842,055	5,663,522	5,704,935	5,747,405
13,858,255	13,861,591	14,203,847	12,876,136	13,255,185	14,742,839	18,645,653	15,799,340	16,023,453	16,252,851
4,012,172	4,840,621	4,856,265	590,473	575,279	613,708	681,563	657,937	663,120	668,432
647,745	651,323	649,521	583,114	558,883	583,913	650,139	618,028	622,164	626,406
3,943,919	4,075,299	4,137,506	3,762,559	3,675,227	3,925,444	4,340,513	4,171,395	4,202,464	4,234,323
127,776	131,228	132,325	120,441	117,423	125,416	139,361	134,132	135,168	136,231
2,944,034	3,060,480	3,122,979	2,875,846	2,836,315	3,063,807	3,442,955	3,350,955	3,413,670	3,477,792
$73,769,896	**$74,566,976**	**$75,038,056**	**$80,393,609**	**$80,473,521**	**$75,796,808**	**$75,308,306**	**$77,182,916**	**$77,705,527**	**$78,233,596**
40,182,883	40,476,734	41,404,824	43,487,143	42,265,898	35,879,957	37,863,010	38,041,091	38,222,807	38,408,274
8,452,990	7,606,063	7,177,032	4,054,032	5,072,003	6,667,431	4,706,946	5,481,658	5,542,840	5,606,011
2,464,418	2,619,905	3,018,275	3,227,486	2,914,745	2,900,860	2,930,418	2,942,375	2,967,349	2,992,943
10,768,390	10,840,694	10,097,748	12,453,907	12,756,458	12,784,148	12,393,867	13,205,077	13,245,305	13,286,844
3,347,707	4,328,602	4,495,090	5,121,553	5,154,743	5,086,369	4,856,593	4,702,004	4,769,736	4,838,866
215,014	217,790	200,400	179,870	194,575	192,347	187,255	192,383	197,423	198,738
1,492,315	1,491,456	1,506,205	1,483,633	1,509,518	1,493,411	1,454,654	1,490,351	1,500,617	1,511,149
680,524	678,087	680,038	705,284	714,518	704,247	683,555	697,023	699,552	702,158
236,377	235,874	226,041	203,108	203,686	235,760	236,772	210,302	211,446	212,612
377,745	376,268	377,225	442,795	448,274	441,512	428,226	425,288	429,437	430,734
4,366,918	4,499,876	4,648,318	7,679,865	7,858,002	8,041,103	8,229,312	8,422,764	8,532,742	8,644,989
1,119,619	1,130,110	1,140,812	1,274,051	1,298,696	1,287,982	1,257,962	1,290,828	1,303,727	1,316,938
64,996	65,517	66,048	80,882	82,403	81,680	79,734	81,774	82,548	83,340
$106,496,782	**$108,485,681**	**$109,515,016**	**$110,269,743**	**$110,466,564**	**$108,143,803**	**$112,986,984**	**$111,464,998**	**$112,404,396**	**$113,359,027**
6,120,505	6,234,809	6,293,966	6,337,342	6,348,653	6,215,161	6,493,505	6,406,034	6,460,023	6,514,887
3,672,303	3,740,886	3,776,380	3,802,405	3,809,192	3,729,097	3,896,103	3,843,621	3,876,014	3,908,932
6,120,505	6,234,809	6,293,966	6,337,342	6,348,653	6,215,161	6,493,505	6,406,034	6,460,023	6,514,887
24,482,019	24,939,237	25,175,866	25,349,366	25,394,612	24,860,644	25,974,019	25,624,138	25,840,091	26,059,546
$146,892,113	**$149,635,422**	**$151,055,194**	**$152,096,197**	**$152,367,675**	**$149,163,866**	**$155,844,116**	**$153,744,825**	**$155,040,546**	**$156,357,278**

DTE Electric Company

WP KLB-2 EWR Model 1.50%_Flat Costs High: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**182,911**	**166,123**	**152,514**	**159,187**	**182,860**	**204,862**	**208,039**	**205,712**	**222,474**	**218,292**	**201,006**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	18,291	29,251	36,896	37,896	38,981	40,199	41,642	43,032	44,332	21,829	26,348
Electronics	27,392	19,865	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,286	2,077	15,374	14,642	19,777	22,032	23,584	4,691	23,289	21,518	28,080
HVAC Shell	3,225	1,829	1,661	1,525	1,592	1,829	2,049	2,080	2,057	2,225	2,183	2,010
HVAC Equipment	17,476	13,718	12,459	12,986	11,939	18,561	23,510	15,603	15,428	16,686	16,372	17,761
Miscellaneous	560	457	415	856	398	1,028	1,122	520	514	556	546	1,526
Cross-Cutting	54,316	32,924	24,918	22,877	23,878	27,429	30,729	31,206	30,857	33,371	32,744	30,151
Commerical & Industrial	**387,974**	**461,890**	**478,941**	**493,576**	**485,869**	**461,526**	**438,791**	**435,253**	**437,388**	**420,470**	**424,541**	**441,756**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	158,025	152,435	138,096	152,637	160,805
Refrigeration	18,817	74,596	79,560	83,508	54,828	34,081	28,614	21,110	21,213	20,393	20,590	23,215
HVAC	31,038	36,951	38,315	39,486	38,869	36,922	35,103	34,820	34,991	33,638	33,963	35,341
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,215	1,154	1,097	1,088	1,093	1,051	2,941	2,937
Ventilation	7,759	9,238	9,579	9,872	9,717	9,231	8,776	8,705	8,748	8,409	8,491	8,835
Cooking	1,940	2,309	2,395	2,468	2,429	2,308	2,194	2,176	2,187	2,102	2,123	2,209
Pools	970	1,155	1,197	1,234	1,215	1,154	1,097	1,088	1,093	904	1,061	1,104
Other	970	1,155	1,197	1,234	1,215	1,154	1,097	1,088	1,093	1,051	1,061	1,104
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	10,881	10,935	10,512	10,614	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**644,800**	**645,064**	**646,091**	**645,056**	**644,387**	**643,654**	**643,291**	**643,100**	**642,944**	**642,833**	**642,763**
Pilots	35,143	35,043	35,058	35,114	35,057	35,021	34,981	34,961	34,951	34,943	34,937	34,933
Education	21,086	21,026	21,035	21,068	21,034	21,013	20,989	20,977	20,971	20,966	20,962	20,960
Total Savings	**702,851**	**700,870**	**701,156**	**702,273**	**701,147**	**700,420**	**699,624**	**699,230**	**699,022**	**698,853**	**698,732**	**698,655**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$32,522,952**	**$34,419,214**	**$37,728,351**	**$38,546,366**	**$45,205,437**	**$50,553,548**	**$49,946,638**	**$47,421,865**	**$54,422,831**	**$56,997,812**	**$52,999,363**
Lighting	15,192,489	13,879,077	10,548,303	6,134,824	6,078,882	6,030,399	5,993,008	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	5,067,115	8,175,110	10,304,597	10,612,124	10,961,944	11,374,329	11,894,044	12,396,191	12,806,373	8,294,298	10,190,306
Electronics	3,741,531	3,197,662	6,674,669	7,583,032	8,729,315	9,855,599	11,413,096	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	764,541	701,638	5,232,561	5,028,082	6,859,587	7,727,301	8,377,686	1,688,268	8,486,573	7,859,785	10,368,453
HVAC Shell	1,153,480	865,024	786,921	724,774	760,235	878,655	991,328	1,014,872	1,012,268	1,104,462	1,101,915	1,029,343
HVAC Equipment	5,124,891	5,289,247	4,828,986	5,035,151	4,639,979	7,236,753	9,206,340	6,147,739	6,114,142	6,634,722	6,617,730	7,253,755
Miscellaneous	161,295	172,565	157,650	326,703	152,750	396,832	435,205	202,788	201,562	219,134	216,168	607,608
Cross-Cutting	5,071,274	3,287,722	2,545,937	2,386,710	2,545,000	2,985,667	3,412,940	3,535,798	3,566,039	3,934,016	3,936,206	3,695,314
Commerical & Industrial	**$58,998,406**	**$91,241,240**	**$93,661,398**	**$95,768,548**	**$90,573,602**	**$76,941,203**	**$72,466,266**	**$71,595,141**	**$73,616,375**	**$70,780,263**	**$66,465,761**	**$70,107,125**
Lighting	30,093,471	41,089,903	41,278,213	41,399,761	37,726,412	29,325,757	27,252,671	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	10,642,638	10,754,030	10,861,181	15,684,802	15,798,594	14,753,327	14,696,635	15,612,930	14,195,922	14,460,574	15,611,940
Refrigeration	2,290,235	11,910,282	12,777,461	13,486,647	7,287,430	4,372,969	3,626,457	3,005,663	2,638,896	2,675,680	2,666,604	2,956,741
HVAC	9,320,249	15,326,192	15,927,876	16,450,301	16,578,496	14,773,482	14,271,149	12,827,300	12,917,185	12,594,603	12,103,314	12,977,650
Compressed Air	2,139,099	3,253,762	3,642,154	4,043,241	4,030,827	3,476,255	3,417,165	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	485,500	488,914	492,199	166,977	165,376	161,926	163,013	164,744	163,074	244,170	246,482
Ventilation	1,055,856	1,664,455	1,734,875	1,796,784	1,779,674	1,706,220	1,632,851	1,621,060	1,636,467	1,582,299	1,701,663	1,779,516
Cooking	529,885	868,376	902,677	932,485	920,056	875,973	834,677	829,780	835,714	805,218	814,905	951,721
Pools	179,302	288,535	300,308	310,597	307,387	295,533	283,536	282,166	284,482	237,294	464,704	484,549
Other	421,161	699,875	726,833	750,156	727,849	604,450	563,488	559,861	563,539	534,938	454,859	474,305
Machine Drive	2,915,557	3,683,523	3,789,025	3,895,746	4,004,090	4,176,911	4,289,557	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,271,543	1,281,934	1,291,930	1,301,670	1,311,341	1,320,721	1,304,778	1,320,498	1,278,565	1,300,377	1,370,092
Agriculture	44,326	56,658	57,097	57,520	57,932	58,344	58,740	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$123,764,192**	**$128,080,612**	**$133,496,899**	**$129,119,968**	**$122,146,640**	**$123,019,814**	**$121,541,779**	**$121,038,240**	**$125,203,094**	**$123,463,573**	**$123,106,488**
Pilots	5,666,586	7,112,885	7,360,955	7,672,236	7,420,688	7,019,922	7,070,104	6,985,160	6,956,221	7,195,580	7,095,608	7,075,086
Education	3,399,952	4,267,731	4,416,573	4,603,341	4,452,413	4,211,953	4,242,063	4,191,096	4,173,732	4,317,348	4,257,365	4,245,051
EM&V	5,666,586	7,112,885	7,360,955	7,672,236	7,420,688	7,019,922	7,070,104	6,985,160	6,956,221	7,195,580	7,095,608	7,075,086
Performance Incentive	22,666,345	28,451,538	29,443,819	30,688,942	29,682,751	28,079,687	28,280,417	27,940,639	27,824,883	28,782,321	28,382,431	28,300,342
Total Spend	**$135,998,068**	**$170,709,231**	**$176,662,913**	**$184,133,654**	**$178,096,507**	**$168,478,123**	**$169,682,502**	**$167,643,833**	**$166,949,297**	**$172,693,923**	**$170,294,584**	**$169,802,053**

DTE Electric Company

WP KLB-2 EWR Model 1.50%_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
163,223	**166,440**	**166,621**	**150,550**	**145,691**	**154,443**	**170,313**	**162,663**	**162,644**	**162,631**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
16,322	16,644	16,662	15,055	14,569	15,444	17,031	16,266	16,264	16,263
88,809	88,894	89,506	78,726	75,561	81,424	92,376	87,512	87,500	87,492
13,609	15,908	15,674	1,882	1,821	1,931	2,129	2,033	2,033	2,033
1,632	1,664	1,666	1,506	1,457	1,544	1,703	1,627	1,626	1,626
12,242	12,483	12,497	11,291	10,927	11,583	12,773	12,200	12,198	12,197
408	416	417	376	364	386	426	407	407	407
24,484	24,966	24,993	22,583	21,854	23,166	25,547	24,399	24,397	24,395
479,533	**476,230**	**475,988**	**491,965**	**496,667**	**487,790**	**471,749**	**479,278**	**479,223**	**479,184**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
95,708	87,896	82,776	48,010	54,934	73,556	53,155	59,560	59,515	59,483
23,257	23,097	23,085	23,860	24,088	23,658	22,880	23,245	23,242	23,240
38,363	38,098	38,079	39,357	39,733	39,023	37,740	38,342	38,338	38,335
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,230	1,242	1,219	1,179	1,198	1,198	1,198
9,591	9,525	9,520	9,839	9,933	9,756	9,435	9,586	9,584	9,584
2,398	2,381	2,380	2,460	2,483	2,439	2,359	2,396	2,396	2,396
1,199	1,191	1,190	1,230	1,242	1,219	1,134	1,050	1,050	1,050
1,199	1,191	1,190	1,230	1,242	1,219	1,179	1,198	1,198	1,198
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	12,299	12,417	12,195	11,794	11,982	11,981	11,980
551	551	551	738	745	732	708	719	719	719
642,756	**642,670**	**642,610**	**642,515**	**642,358**	**642,233**	**642,062**	**641,941**	**641,867**	**641,815**
34,932	34,928	34,924	34,919	34,911	34,904	34,895	34,888	34,884	34,881
20,959	20,957	20,955	20,952	20,946	20,942	20,937	20,933	20,930	20,929
698,648	**698,554**	**698,489**	**698,386**	**698,215**	**698,079**	**697,894**	**697,762**	**697,682**	**697,625**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
$39,102,235	**$40,493,979**	**$41,119,313**	**$35,180,433**	**$35,440,596**	**$38,197,376**	**$44,809,418**	**$40,185,457**	**$40,601,590**	**$41,027,694**	**#REF!**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370	
6,395,796	6,604,272	6,786,534	6,264,900	6,187,205	6,664,683	7,444,066	7,211,850	7,253,084	7,295,429	
15,634,918	15,550,229	15,922,036	14,472,677	15,094,598	16,836,858	21,745,779	17,842,051	18,065,879	18,295,076	
5,093,822	6,154,266	6,172,393	749,786	729,244	776,568	860,946	830,048	835,211	840,510	
848,845	850,848	846,552	758,022	724,338	754,036	838,597	795,008	799,123	803,351	
5,060,385	5,224,757	5,300,712	4,812,603	4,694,829	5,006,832	5,524,438	5,299,965	5,330,903	5,362,670	
163,412	167,566	168,702	153,310	149,230	159,134	176,544	169,645	170,677	171,737	
3,058,194	3,177,918	3,241,375	2,983,387	2,940,888	3,174,976	3,565,917	3,468,737	3,531,438	3,595,551	
$95,921,043	**$96,932,025**	**$97,413,179**	**$104,528,100**	**$104,329,880**	**$97,624,654**	**$97,065,777**	**$99,356,690**	**$99,880,846**	**$100,407,841**	**#REF!**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614	
10,186,716	9,095,397	8,551,423	4,784,367	6,069,740	7,917,961	5,539,126	6,475,827	6,536,478	6,599,119	
3,061,568	3,277,499	3,837,295	4,110,179	3,648,256	3,627,245	3,676,212	3,674,518	3,699,408	3,724,942	
14,626,252	14,719,328	13,642,630	16,965,702	17,372,929	17,410,549	16,864,123	17,992,026	18,031,700	18,072,851	
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112	
249,200	251,976	234,152	231,157	251,384	248,140	241,214	247,571	254,215	255,526	
1,942,588	1,938,806	1,956,040	1,913,077	1,943,809	1,920,314	1,867,727	1,910,980	1,921,198	1,931,696	
924,855	920,735	922,563	955,950	967,579	952,785	923,920	941,224	943,725	946,311	
314,020	312,982	298,456	264,355	264,400	310,158	312,959	276,553	277,697	278,863	
515,974	513,545	514,432	606,765	613,810	604,090	585,458	580,292	585,663	586,948	
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354	
1,380,368	1,390,859	1,401,561	1,562,075	1,589,472	1,573,562	1,534,150	1,571,424	1,584,291	1,597,480	
81,974	82,495	83,026	100,066	101,770	100,701	98,130	100,463	101,235	102,026	
$135,023,278	**$137,426,004**	**$138,532,492**	**$139,708,533**	**$139,770,476**	**$135,822,030**	**$141,875,196**	**$139,542,147**	**$140,482,436**	**$141,435,535**	
7,759,959	7,898,046	7,961,637	8,029,226	8,032,786	7,805,864	8,153,747	8,019,664	8,073,703	8,128,479	
4,655,975	4,738,828	4,776,982	4,817,536	4,819,672	4,683,518	4,892,248	4,811,798	4,844,222	4,877,087	
7,759,959	7,898,046	7,961,637	8,029,226	8,032,786	7,805,864	8,153,747	8,019,664	8,073,703	8,128,479	
31,039,834	31,592,185	31,846,550	32,116,904	32,131,144	31,223,455	32,614,988	32,078,654	32,294,813	32,513,916	
$186,239,004	**$189,553,108**	**$191,079,299**	**$192,701,425**	**$192,786,863**	**$187,340,731**	**$195,689,925**	**$192,471,927**	**$193,768,877**	**$195,083,497**	

DTE Electric Company

WP KLB-3 EWR Model 1.50%_Flat Costs Low: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**182,911**	**166,123**	**152,514**	**159,187**	**182,860**	**204,862**	**208,039**	**205,712**	**222,474**	**218,292**	**201,006**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	18,291	29,251	36,896	37,896	38,981	40,199	41,642	43,032	44,332	21,829	26,348
Electronics	27,392	19,865	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,286	2,077	15,374	14,642	19,777	22,032	23,584	4,691	23,289	21,518	28,080
HVAC Shell	3,225	1,829	1,661	1,525	1,592	1,829	2,049	2,080	2,057	2,225	2,183	2,010
HVAC Equipment	17,476	13,718	12,459	12,986	11,939	18,561	23,510	15,603	15,428	16,686	16,372	17,761
Miscellaneous	560	457	415	856	398	1,028	1,122	520	514	556	546	1,526
Cross-Cutting	54,316	32,924	24,918	22,877	23,878	27,429	30,729	31,206	30,857	33,371	32,744	30,151
Commerical & Industrial	**387,974**	**461,890**	**478,941**	**493,576**	**485,869**	**461,526**	**438,791**	**435,253**	**437,388**	**420,470**	**424,541**	**441,756**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	158,025	152,435	138,096	152,637	160,805
Refrigeration	18,817	74,596	79,560	83,508	54,828	34,081	28,614	21,110	21,213	20,393	20,590	23,215
HVAC	31,038	36,951	38,315	39,486	38,869	36,922	35,103	34,820	34,991	33,638	33,963	35,341
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,215	1,154	1,097	1,088	1,093	1,051	2,941	2,937
Ventilation	7,759	9,238	9,579	9,872	9,717	9,231	8,776	8,705	8,748	8,409	8,491	8,835
Cooking	1,940	2,309	2,395	2,468	2,429	2,308	2,194	2,176	2,187	2,102	2,123	2,209
Pools	970	1,155	1,197	1,234	1,215	1,154	1,097	1,088	1,093	904	1,061	1,104
Other	970	1,155	1,197	1,234	1,215	1,154	1,097	1,088	1,093	1,051	1,061	1,104
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	10,881	10,935	10,512	10,614	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**644,800**	**645,064**	**646,091**	**645,056**	**644,387**	**643,654**	**643,291**	**643,100**	**642,944**	**642,833**	**642,763**
Pilots	35,143	35,043	35,058	35,114	35,057	35,021	34,981	34,961	34,951	34,943	34,937	34,933
Education	21,086	21,026	21,035	21,068	21,034	21,013	20,989	20,977	20,971	20,966	20,962	20,960
Total Savings	**702,851**	**700,870**	**701,156**	**702,273**	**701,147**	**700,420**	**699,624**	**699,230**	**699,022**	**698,853**	**698,732**	**698,655**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$27,500,503**	**$28,504,223**	**$30,557,217**	**$31,410,856**	**$36,844,356**	**$41,337,197**	**$41,129,524**	**$39,418,143**	**$44,963,728**	**$46,775,580**	**$43,561,966**
Lighting	15,192,489	12,136,533	8,828,801	4,737,578	4,719,635	4,709,323	4,710,094	4,736,136	4,750,607	2,467,314	2,250,566	2,148,004
Appliances	7,176,137	4,020,424	6,499,225	8,216,553	8,482,714	8,781,986	9,129,516	9,560,221	9,979,049	10,332,968	6,493,720	7,980,316
Electronics	3,741,531	2,752,535	5,758,710	6,550,910	7,561,206	8,551,149	9,949,215	11,174,210	14,261,053	15,548,181	21,907,812	14,808,675
Water Heating	1,979,097	594,359	546,281	4,080,856	3,926,982	5,364,165	6,048,965	6,563,487	1,323,702	6,659,541	6,179,754	8,160,711
HVAC Shell	1,153,480	652,861	594,953	548,815	576,448	667,064	753,427	772,079	770,816	841,801	840,112	785,164
HVAC Equipment	5,124,891	4,057,556	3,711,098	3,877,737	3,580,115	5,593,593	7,127,238	4,765,933	4,746,612	5,159,386	5,148,194	5,648,638
Miscellaneous	161,295	132,631	121,382	251,965	117,996	307,029	337,227	157,369	156,650	170,563	168,511	474,376
Cross-Cutting	5,071,274	3,153,604	2,443,772	2,292,803	2,445,760	2,870,049	3,281,515	3,400,090	3,429,653	3,783,973	3,786,911	3,556,081
Commerical & Industrial	**$58,998,406**	**$68,903,212**	**$70,917,774**	**$72,689,844**	**$69,093,114**	**$59,385,999**	**$56,092,588**	**$55,549,582**	**$57,102,929**	**$55,011,866**	**$52,158,047**	**$55,055,557**
Lighting	30,093,471	30,220,735	30,402,809	30,524,357	27,858,058	21,686,632	20,200,769	20,946,474	21,732,060	20,981,008	17,687,868	18,319,364
Office Equipment	8,632,730	8,745,871	8,857,263	8,964,415	12,718,277	13,129,310	12,285,094	12,260,170	12,870,779	11,732,247	12,147,304	13,105,369
Refrigeration	2,290,235	9,150,252	9,833,748	10,396,885	5,743,474	3,469,232	2,888,450	2,367,464	2,117,443	2,138,061	2,139,775	2,384,005
HVAC	9,320,249	11,131,082	11,577,897	11,967,360	12,060,275	10,783,610	10,419,101	9,413,749	9,487,747	9,253,477	8,922,881	9,562,801
Compressed Air	2,139,099	2,589,147	2,954,135	3,331,819	3,386,019	3,003,539	2,992,038	3,166,419	3,345,910	3,391,118	3,248,480	3,297,582
Water Heating	376,110	379,579	382,993	386,278	131,113	129,581	126,764	127,691	129,250	127,816	209,939	212,296
Ventilation	1,055,856	1,265,806	1,321,508	1,370,786	1,359,604	1,304,897	1,250,319	1,243,402	1,256,956	1,216,923	1,303,804	1,365,273
Cooking	529,885	633,035	658,648	680,999	672,497	640,817	611,105	608,011	612,857	590,981	598,594	696,108
Pools	179,302	214,560	223,603	231,548	229,400	220,691	211,890	211,099	213,066	177,857	339,373	354,136
Other	421,161	502,498	522,170	539,239	523,723	436,933	407,857	405,485	408,406	388,121	332,481	346,965
Machine Drive	2,915,557	3,014,895	3,116,417	3,219,158	3,323,522	3,483,522	3,592,188	3,703,200	3,817,170	3,934,563	4,112,498	4,237,831
Process Cooling & Heating	1,000,425	1,010,980	1,021,371	1,031,366	1,041,106	1,050,777	1,060,157	1,049,169	1,063,635	1,031,638	1,051,064	1,109,343
Agriculture	44,326	44,773	45,212	45,635	46,046	46,458	46,854	47,250	47,649	48,057	63,986	64,486
Overall Program (Res + C&I)	**$98,598,600**	**$96,403,715**	**$99,421,997**	**$103,247,060**	**$100,503,970**	**$96,230,355**	**$97,429,786**	**$96,679,106**	**$96,521,071**	**$99,975,594**	**$98,933,626**	**$98,617,523**
Pilots	5,666,586	5,540,443	5,713,908	5,933,739	5,776,090	5,530,480	5,599,413	5,556,270	5,547,188	5,745,724	5,685,841	5,667,674
Education	3,399,952	3,324,266	3,428,345	3,560,243	3,465,654	3,318,288	3,359,648	3,333,762	3,328,313	3,447,434	3,411,504	3,400,604
EM&V	5,666,586	5,540,443	5,713,908	5,933,739	5,776,090	5,530,480	5,599,413	5,556,270	5,547,188	5,745,724	5,685,841	5,667,674
Performance Incentive	22,666,345	22,161,774	22,855,631	23,734,956	23,104,361	22,121,921	22,397,652	22,225,082	22,188,752	22,982,895	22,743,362	22,670,695
Total Spend	**$135,998,068**	**$132,970,641**	**$137,133,789**	**$142,409,738**	**$138,626,166**	**$132,731,524**	**$134,385,911**	**$133,350,491**	**$133,132,512**	**$137,897,371**	**$136,460,174**	**$136,024,170**

DTE Electric Company

WP KLB-3 EWR Model 1.50%_Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
163,223	**166,440**	**166,621**	**150,550**	**145,691**	**154,443**	**170,313**	**162,663**	**162,644**	**162,631**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
16,322	16,644	16,662	15,055	14,569	15,444	17,031	16,266	16,264	16,263
88,809	88,894	89,506	78,726	75,561	81,424	92,376	87,512	87,500	87,492
13,609	15,908	15,674	1,882	1,821	1,931	2,129	2,033	2,033	2,033
1,632	1,664	1,666	1,506	1,457	1,544	1,703	1,627	1,626	1,626
12,242	12,483	12,497	11,291	10,927	11,583	12,773	12,200	12,198	12,197
408	416	417	376	364	386	426	407	407	407
24,484	24,966	24,993	22,583	21,854	23,166	25,547	24,399	24,397	24,395
479,533	**476,230**	**475,988**	**491,965**	**496,667**	**487,790**	**471,749**	**479,278**	**479,223**	**479,184**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
95,708	87,896	82,776	48,010	54,934	73,556	53,155	59,560	59,515	59,483
23,257	23,097	23,085	23,860	24,088	23,658	22,880	23,245	23,242	23,240
38,363	38,098	38,079	39,357	39,733	39,023	37,740	38,342	38,338	38,335
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,230	1,242	1,219	1,179	1,198	1,198	1,198
9,591	9,525	9,520	9,839	9,933	9,756	9,435	9,586	9,584	9,584
2,398	2,381	2,380	2,460	2,483	2,439	2,359	2,396	2,396	2,396
1,199	1,191	1,190	1,230	1,242	1,219	1,134	1,050	1,050	1,050
1,199	1,191	1,190	1,230	1,242	1,219	1,179	1,198	1,198	1,198
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	12,299	12,417	12,195	11,794	11,982	11,981	11,980
551	551	551	738	745	732	708	719	719	719
642,756	**642,670**	**642,610**	**642,515**	**642,358**	**642,233**	**642,062**	**641,941**	**641,867**	**641,815**
34,932	34,928	34,924	34,919	34,911	34,904	34,895	34,888	34,884	34,881
20,959	20,957	20,955	20,952	20,946	20,942	20,937	20,933	20,930	20,929
698,648	**698,554**	**698,489**	**698,386**	**698,215**	**698,079**	**697,894**	**697,762**	**697,682**	**697,625**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$32,726,886	**$33,918,705**	**$34,476,960**	**$29,876,134**	**$29,993,043**	**$32,346,994**	**$37,678,679**	**$34,282,082**	**$34,698,868**	**$35,125,431**
2,180,395	2,117,880	2,054,599	4,157,152	4,125,225	4,065,705	3,936,440	3,886,772	3,933,895	3,981,991
5,012,589	5,180,283	5,319,918	4,910,413	4,849,506	5,226,161	5,842,055	5,663,522	5,704,935	5,747,405
13,858,255	13,861,591	14,203,847	12,876,136	13,255,185	14,742,839	18,645,653	15,799,340	16,023,453	16,252,851
4,012,172	4,840,621	4,856,265	590,473	575,279	613,708	681,563	657,937	663,120	668,432
647,745	651,323	649,521	583,114	558,883	583,913	650,139	618,028	622,164	626,406
3,943,919	4,075,299	4,137,506	3,762,559	3,675,227	3,925,444	4,340,513	4,171,395	4,202,464	4,234,323
127,776	131,228	132,325	120,441	117,423	125,416	139,361	134,132	135,168	136,231
2,944,034	3,060,480	3,122,979	2,875,846	2,836,315	3,063,807	3,442,955	3,350,955	3,413,670	3,477,792
$73,769,896	**$74,566,976**	**$75,038,056**	**$80,393,609**	**$80,473,521**	**$75,796,808**	**$75,308,306**	**$77,182,916**	**$77,705,527**	**$78,233,596**
40,182,883	40,476,734	41,404,824	43,487,143	42,265,898	35,879,957	37,863,010	38,041,091	38,222,807	38,408,274
8,452,990	7,606,063	7,177,032	4,054,032	5,072,003	6,667,431	4,706,946	5,481,658	5,542,840	5,606,011
2,464,418	2,619,905	3,018,275	3,227,486	2,914,745	2,900,860	2,930,418	2,942,375	2,967,349	2,992,943
10,768,390	10,840,694	10,097,748	12,453,907	12,756,458	12,784,148	12,393,867	13,205,077	13,245,305	13,286,844
3,347,707	4,328,602	4,495,090	5,121,553	5,154,743	5,086,369	4,856,593	4,702,004	4,769,736	4,838,866
215,014	217,790	200,400	179,870	194,575	192,347	187,255	192,383	197,423	198,738
1,492,315	1,491,456	1,506,205	1,483,633	1,509,518	1,493,411	1,454,654	1,490,351	1,500,617	1,511,149
680,524	678,087	680,038	705,284	714,518	704,247	683,555	697,023	699,552	702,158
236,377	235,874	226,041	203,108	203,686	235,760	236,772	210,302	211,446	212,612
377,745	376,268	377,225	442,795	448,274	441,512	428,226	425,288	429,437	430,734
4,366,918	4,499,876	4,648,318	7,679,865	7,858,002	8,041,103	8,229,312	8,422,764	8,532,742	8,644,989
1,119,619	1,130,110	1,140,812	1,274,051	1,298,696	1,287,982	1,257,962	1,290,828	1,303,727	1,316,938
64,996	65,517	66,048	80,882	82,403	81,680	79,734	81,774	82,548	83,340
$106,496,782	**$108,485,681**	**$109,515,016**	**$110,269,743**	**$110,466,564**	**$108,143,803**	**$112,986,984**	**$111,464,998**	**$112,404,396**	**$113,359,027**
6,120,505	6,234,809	6,293,966	6,337,342	6,348,653	6,215,161	6,493,505	6,406,034	6,460,023	6,514,887
3,672,303	3,740,886	3,776,380	3,802,405	3,809,192	3,729,097	3,896,103	3,843,621	3,876,014	3,908,932
6,120,505	6,234,809	6,293,966	6,337,342	6,348,653	6,215,161	6,493,505	6,406,034	6,460,023	6,514,887
24,482,019	24,939,237	25,175,866	25,349,366	25,394,612	24,860,644	25,974,019	25,624,138	25,840,091	26,059,546
$146,892,113	**$149,635,422**	**$151,055,194**	**$152,096,197**	**$152,367,675**	**$149,163,866**	**$155,844,116**	**$153,744,825**	**$155,040,546**	**$156,357,278**

DTE Electric Company

WP KLB-4 EWR Model 1.75% Flat Costs Low: Output

Case No: U-20471
Workpaper: KLB-4
Page: 1 of 2
Witness: K. L. Bilyeu

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**193,810**	**177,489**	**184,815**	**211,794**	**236,715**	**239,923**	**236,814**	**255,672**	**250,613**	**230,577**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	25,736	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	34,369	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,667	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	2,134	1,938	1,775	1,848	2,118	2,367	2,399	2,368	2,557	2,506	2,306
HVAC Equipment	17,476	16,005	17,393	33,965	29,980	42,865	50,266	40,753	18,549	38,292	30,884	42,600
Miscellaneous	560	533	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	38,411	29,071	26,623	27,722	31,769	35,507	35,988	35,522	38,351	37,592	34,587
Commerical & Industrial	**387,974**	**538,871**	**558,765**	**574,402**	**564,090**	**534,553**	**507,015**	**501,960**	**503,516**	**483,213**	**487,400**	**506,744**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	117,561	117,561	117,561	124,250	98,893	89,326	78,192	31,237	49,818	60,559	81,054
HVAC	31,038	43,110	44,701	45,952	45,127	42,764	40,561	40,157	40,281	38,657	38,992	40,540
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,268	1,255	1,259	1,208	2,941	2,937
Ventilation	7,759	36,326	44,218	49,369	11,282	10,691	10,140	10,039	10,070	9,664	9,748	10,135
Cooking	1,940	2,694	2,794	2,872	2,820	2,673	2,535	2,510	2,518	2,416	2,437	2,534
Pools	970	1,347	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,219	1,267
Other	970	1,347	1,397	1,436	1,410	1,336	1,268	1,255	1,259	1,208	1,219	1,267
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**752,267**	**752,574**	**751,891**	**748,905**	**746,348**	**743,730**	**741,883**	**740,330**	**738,885**	**738,013**	**737,321**
Pilots	35,143	40,884	40,901	40,864	40,701	40,562	40,420	40,317	40,230	40,148	40,094	40,054
Education	21,086	24,530	24,540	24,518	24,421	24,337	24,252	24,190	24,138	24,089	24,056	24,032
Total Savings	**702,851**	**817,681**	**818,016**	**817,273**	**814,027**	**811,247**	**808,401**	**806,390**	**804,699**	**803,122**	**802,163**	**801,407**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$32,578,518**	**$35,031,378**	**$37,287,068**	**$38,257,772**	**$44,728,613**	**$50,075,687**	**$49,922,682**	**$47,522,606**	**$54,148,449**	**$55,723,503**	**$52,100,565**
Lighting	15,192,489	12,136,533	8,828,801	4,737,578	4,719,635	4,709,323	4,710,094	4,736,136	4,750,607	2,467,314	2,250,566	2,148,004
Appliances	7,176,137	5,656,751	8,019,962	8,216,553	8,482,714	8,781,986	9,129,516	9,560,221	9,979,049	10,332,968	7,922,275	7,980,316
Electronics	3,741,531	4,762,388	5,758,710	6,550,910	7,561,206	8,551,149	9,949,215	11,174,210	14,261,053	15,548,181	21,907,812	14,808,675
Water Heating	1,979,097	693,419	3,471,060	4,080,856	4,716,424	5,364,165	6,048,965	6,820,622	7,583,554	8,209,228	8,154,978	8,160,711
HVAC Shell	1,153,480	761,671	694,111	638,687	669,253	772,613	870,571	890,409	887,355	967,415	964,502	900,672
HVAC Equipment	5,124,891	4,733,815	5,180,699	10,142,261	8,990,050	12,918,175	15,238,369	12,448,087	5,706,671	11,840,246	9,711,446	13,548,585
Miscellaneous	161,295	154,737	226,966	251,965	278,979	307,029	337,227	371,805	406,135	434,476	464,312	474,376
Cross-Cutting	5,071,274	3,679,205	2,851,067	2,668,260	2,839,511	3,324,175	3,791,730	3,921,192	3,948,180	4,348,620	4,347,612	4,079,226
Commerical & Industrial	**$58,998,406**	**$79,965,435**	**$82,557,224**	**$84,611,771**	**$78,776,445**	**$68,122,011**	**$64,215,147**	**$63,942,857**	**$64,028,037**	**$62,076,382**	**$59,294,824**	**$62,808,456**
Lighting	30,093,471	30,220,735	30,402,809	30,524,357	27,858,058	21,686,632	20,200,769	20,946,474	21,732,060	20,981,008	17,687,868	18,319,364
Office Equipment	8,632,730	8,745,871	8,857,263	8,964,415	12,718,277	13,129,310	12,285,094	12,420,023	16,979,561	13,927,133	13,379,959	13,105,369
Refrigeration	2,290,235	14,420,529	14,530,660	14,636,598	13,015,669	10,066,535	9,017,192	8,769,300	3,118,018	5,223,146	6,293,384	8,323,699
HVAC	9,320,249	12,986,262	13,507,546	13,927,070	14,001,901	12,489,892	12,039,077	10,856,512	10,922,195	10,634,287	10,244,030	10,969,610
Compressed Air	2,139,099	2,589,147	2,954,135	3,331,819	3,386,019	3,003,539	2,992,038	3,166,419	3,345,910	3,391,118	3,248,480	3,297,582
Water Heating	376,110	379,579	382,993	386,278	152,221	150,084	146,473	147,261	148,791	146,888	209,939	212,296
Ventilation	1,055,856	4,977,555	6,100,326	6,855,554	1,578,491	1,511,370	1,444,721	1,433,967	1,446,995	1,398,513	1,496,850	1,566,122
Cooking	529,885	738,541	768,423	792,515	780,765	742,213	706,121	701,196	705,515	679,168	687,223	798,514
Pools	179,302	250,320	260,870	269,465	266,332	255,611	213,189	214,120	215,060	177,857	389,621	406,234
Other	421,161	586,248	609,199	627,542	608,039	506,069	471,272	467,631	470,153	446,036	381,709	398,008
Machine Drive	2,915,557	3,014,895	3,116,417	3,219,158	3,323,522	3,483,522	3,592,188	3,703,200	3,817,170	3,934,563	4,112,498	4,237,831
Process Cooling & Heating	1,000,425	1,010,980	1,021,371	1,031,366	1,041,106	1,050,777	1,060,157	1,069,506	1,078,960	1,088,608	1,099,277	1,109,343
Agriculture	44,326	44,773	45,212	45,635	46,046	46,458	46,854	47,250	47,649	48,057	63,986	64,486
Overall Program (Res + C&I)	**$98,598,600**	**$112,543,953**	**$117,588,602**	**$121,898,840**	**$117,034,217**	**$112,850,625**	**$114,290,833**	**$113,865,539**	**$111,550,642**	**$116,224,832**	**$115,018,327**	**$114,909,021**
Pilots	5,666,586	6,468,043	6,757,966	7,005,680	6,726,104	6,485,668	6,568,439	6,543,997	6,410,956	6,679,588	6,610,249	6,603,967
Education	3,399,952	3,880,826	4,054,779	4,203,408	4,035,663	3,891,401	3,941,063	3,926,398	3,846,574	4,007,753	3,966,149	3,962,380
EM&V	5,666,586	6,468,043	6,757,966	7,005,680	6,726,104	6,485,668	6,568,439	6,543,997	6,410,956	6,679,588	6,610,249	6,603,967
Performance Incentive	22,666,345	25,872,173	27,031,863	28,022,722	26,904,418	25,942,672	26,273,755	26,175,986	25,643,826	26,718,352	26,440,995	26,415,867
Total Spend	**$135,998,068**	**$155,233,039**	**$162,191,175**	**$168,136,331**	**$161,426,507**	**$155,656,034**	**$157,642,529**	**$157,055,916**	**$153,862,955**	**$160,310,113**	**$158,645,968**	**$158,495,201**

DTE Electric Company

WP KLB-4 EWR Model 1.75% Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
187,067	**190,678**	**190,751**	**172,412**	**166,856**	**176,869**	**195,102**	**186,257**	**186,177**	**186,171**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
20,323	22,461	21,318	17,241	16,686	17,687	19,510	18,626	18,618	18,617
88,809	88,894	89,506	87,907	89,319	96,001	108,489	99,840	99,840	99,840
27,789	28,572	28,420	7,185	2,086	2,211	2,439	5,337	5,284	5,280
1,871	1,907	1,908	1,724	1,669	1,769	1,951	1,863	1,862	1,862
14,030	14,301	14,306	12,931	12,514	13,265	14,633	13,969	13,963	13,963
468	477	1,475	431	417	442	488	466	465	465
28,060	28,602	28,613	25,862	25,028	26,530	29,265	27,939	27,927	27,926
549,584	**545,584**	**544,921**	**563,404**	**568,818**	**558,620**	**540,413**	**548,796**	**548,561**	**548,544**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
154,656	146,257	140,783	106,055	113,556	131,181	109,116	116,216	116,025	116,011
26,655	26,461	26,429	27,325	27,588	27,093	26,210	26,617	26,605	26,604
43,967	43,647	43,594	45,072	45,505	44,690	43,233	43,904	43,885	43,884
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,409	1,422	1,397	1,351	1,372	1,371	1,371
10,992	10,912	10,898	11,268	11,376	11,172	10,808	10,976	10,971	10,971
2,748	2,728	2,725	2,817	2,844	2,793	2,702	2,744	2,743	2,743
1,374	1,364	1,362	1,409	1,422	1,321	1,134	1,050	1,050	1,050
1,374	1,364	1,362	1,409	1,422	1,397	1,351	1,372	1,371	1,371
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	14,085	14,220	13,965	13,510	13,720	13,714	13,714
551	551	551	845	853	838	811	823	823	823
736,651	**736,262**	**735,673**	**735,816**	**735,674**	**735,489**	**735,515**	**735,053**	**734,738**	**734,716**
40,016	39,998	39,972	39,977	39,969	39,956	39,962	39,950	39,933	39,933
24,009	23,999	23,983	23,986	23,982	23,973	23,977	23,970	23,960	23,960
800,676	**800,259**	**799,628**	**799,779**	**799,625**	**799,418**	**799,455**	**798,972**	**798,631**	**798,608**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$39,255,698	**$40,736,279**	**$41,394,041**	**$34,820,715**	**$34,238,589**	**$36,952,174**	**$43,128,350**	**$39,598,251**	**$40,055,885**	**$40,545,648**
2,180,395	2,117,880	2,054,599	4,157,152	4,125,225	4,065,705	3,936,440	3,886,772	3,933,895	3,981,991
6,241,174	6,990,900	6,806,326	5,623,462	5,553,999	5,985,028	6,692,374	6,484,993	6,530,373	6,579,322
13,858,255	13,861,591	14,203,847	14,377,644	15,668,480	17,382,163	21,897,995	18,024,881	18,283,119	18,546,686
8,192,907	8,694,426	8,805,192	2,254,359	658,850	702,822	780,766	1,726,908	1,723,488	1,736,204
742,368	746,175	743,585	667,789	640,073	668,701	744,767	707,671	712,184	717,077
4,520,052	4,668,787	4,736,702	4,308,927	4,209,131	4,495,440	4,972,281	4,776,440	4,810,512	4,847,227
146,442	150,339	468,540	137,931	134,481	143,627	159,645	153,588	154,726	155,950
3,374,103	3,506,180	3,575,250	3,293,452	3,248,350	3,508,689	3,944,082	3,836,998	3,907,589	3,981,191
$81,316,401	**$81,982,609**	**$82,370,951**	**$88,206,556**	**$88,809,437**	**$83,927,369**	**$83,089,671**	**$85,345,470**	**$85,923,993**	**$86,531,799**
40,182,883	40,476,734	41,404,824	43,487,143	42,265,898	35,879,957	37,863,010	38,041,091	38,222,807	38,408,274
13,659,302	12,656,320	12,206,481	8,955,339	10,484,648	11,890,779	9,662,334	10,696,134	10,805,903	10,933,600
2,824,424	3,001,444	3,455,383	3,696,155	3,338,174	3,322,080	3,356,944	3,369,155	3,396,690	3,426,161
12,341,453	12,419,432	11,560,108	14,262,358	14,609,603	14,640,476	14,197,812	15,120,422	15,161,749	15,210,071
3,347,707	4,328,602	4,495,090	5,121,553	5,154,743	5,086,369	4,856,593	4,702,004	4,769,736	4,838,866
215,014	217,790	200,400	205,989	222,841	220,277	214,511	220,287	225,988	227,505
1,710,315	1,708,657	1,724,334	1,699,073	1,728,807	1,710,262	1,666,381	1,706,520	1,717,739	1,729,883
779,936	776,838	778,522	807,700	818,317	806,508	783,048	798,123	800,769	803,794
270,907	270,224	258,777	232,602	233,276	255,392	236,772	210,302	211,446	212,612
432,926	431,064	431,855	507,094	513,395	505,622	490,555	486,974	491,571	493,081
4,366,918	4,499,876	4,648,318	7,679,865	7,858,002	8,041,103	8,229,312	8,422,764	8,532,742	8,644,989
1,119,619	1,130,110	1,140,812	1,459,058	1,487,359	1,475,004	1,441,060	1,478,057	1,492,362	1,507,561
64,996	65,517	66,048	92,627	94,374	93,541	91,340	93,635	94,491	95,403
$120,572,099	**$122,718,888**	**$123,764,993**	**$123,027,271**	**$123,048,026**	**$120,879,543**	**$126,218,020**	**$124,943,721**	**$125,979,878**	**$127,077,447**
6,929,431	7,052,810	7,112,931	7,070,533	7,071,726	6,947,100	7,253,909	7,180,674	7,240,223	7,303,302
4,157,659	4,231,686	4,267,758	4,242,320	4,243,035	4,168,260	4,352,346	4,308,404	4,344,134	4,381,981
6,929,431	7,052,810	7,112,931	7,070,533	7,071,726	6,947,100	7,253,909	7,180,674	7,240,223	7,303,302
27,717,724	28,211,239	28,451,722	28,282,131	28,286,903	27,788,401	29,015,637	28,722,694	28,960,891	29,213,206
$166,306,344	**$169,267,431**	**$170,710,335**	**$169,692,788**	**$169,721,416**	**$166,730,404**	**$174,093,821**	**$172,336,167**	**$173,765,349**	**$175,279,237**

DTE Electric Company

WP KLB-5 EWR Model 1.75% Tiered Costs: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**193,810**	**177,489**	**184,815**	**211,794**	**236,715**	**239,923**	**236,814**	**255,672**	**250,613**	**230,577**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	25,736	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	34,369	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,667	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	2,134	1,938	1,775	1,848	2,118	2,367	2,399	2,368	2,557	2,506	2,306
HVAC Equipment	17,476	16,005	17,393	33,965	29,980	42,865	50,266	40,753	18,549	38,292	30,884	42,600
Miscellaneous	560	533	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	38,411	29,071	26,623	27,722	31,769	35,507	35,988	35,522	38,351	37,592	34,587
Commerical & Industrial	**387,974**	**538,871**	**558,765**	**574,402**	**564,090**	**534,553**	**507,015**	**501,960**	**503,516**	**483,213**	**487,400**	**506,744**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	117,561	117,561	117,561	124,250	98,893	89,326	78,192	31,237	49,818	60,559	81,054
HVAC	31,038	43,110	44,701	45,952	45,127	42,764	40,561	40,157	40,281	38,657	38,992	40,540
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,268	1,255	1,259	1,208	2,941	2,937
Ventilation	7,759	36,326	44,218	49,369	11,282	10,691	10,140	10,039	10,070	9,664	9,748	10,135
Cooking	1,940	2,694	2,794	2,872	2,820	2,673	2,535	2,510	2,518	2,416	2,437	2,534
Pools	970	1,347	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,219	1,267
Other	970	1,347	1,397	1,436	1,410	1,336	1,268	1,255	1,259	1,208	1,219	1,267
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**752,267**	**752,574**	**751,891**	**748,905**	**746,348**	**743,730**	**741,883**	**740,330**	**738,885**	**738,013**	**737,321**
Pilots	35,143	40,884	40,901	40,864	40,701	40,562	40,420	40,317	40,230	40,148	40,094	40,054
Education	21,086	24,530	24,540	24,518	24,421	24,337	24,252	24,190	24,138	24,089	24,056	24,032
Total Savings	**702,851**	**817,681**	**818,016**	**817,273**	**814,027**	**811,247**	**808,401**	**806,390**	**804,699**	**803,122**	**802,163**	**801,407**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$35,614,266**	**$38,862,458**	**$41,829,639**	**$42,783,478**	**$50,010,866**	**$55,895,631**	**$55,540,384**	**$52,589,118**	**$60,114,149**	**$62,024,713**	**$57,969,891**
Lighting	15,192,489	13,007,805	9,688,552	5,436,201	5,399,258	5,369,861	5,351,551	5,359,764	5,353,783	2,854,384	2,606,114	2,483,147
Appliances	7,176,137	6,393,100	9,053,973	9,260,575	9,547,419	9,871,965	10,251,922	10,727,132	11,187,620	11,569,671	9,020,619	9,085,311
Electronics	3,741,531	5,147,464	6,216,690	7,066,971	8,145,260	9,203,374	10,681,155	11,982,264	15,373,745	16,772,139	23,958,930	15,922,485
Water Heating	1,979,097	792,691	3,964,627	4,656,708	5,377,651	6,111,876	6,888,133	7,763,259	8,627,863	9,335,321	9,263,486	9,264,582
HVAC Shell	1,153,480	885,433	806,093	741,073	775,940	895,148	1,008,016	1,030,411	1,026,334	1,118,343	1,114,785	1,040,722
HVAC Equipment	5,124,891	5,452,302	5,960,986	11,655,875	10,320,766	14,815,581	17,460,977	14,252,649	6,528,735	13,533,116	11,097,496	15,473,568
Miscellaneous	161,295	178,031	260,873	289,334	320,063	351,931	386,216	425,460	464,355	496,339	529,970	540,992
Cross-Cutting	5,071,274	3,757,440	2,910,664	2,722,902	2,897,120	3,391,131	3,867,660	3,999,446	4,026,684	4,434,837	4,433,312	4,159,083
Commerical & Industrial	**$58,998,406**	**$92,905,598**	**$95,785,728**	**$98,044,738**	**$90,937,182**	**$78,146,932**	**$73,546,573**	**$73,169,435**	**$73,167,035**	**$70,891,839**	**$67,382,353**	**$71,367,134**
Lighting	30,093,471	35,655,319	35,840,511	35,962,059	32,792,235	25,506,195	23,726,720	24,593,871	25,502,067	24,592,234	20,706,183	21,432,243
Office Equipment	8,632,730	9,694,255	9,805,647	9,912,798	14,201,540	14,463,952	13,519,211	13,654,139	18,788,329	15,389,424	14,653,965	14,358,654
Refrigeration	2,290,235	16,595,392	16,705,523	16,811,461	14,765,099	11,377,704	10,169,152	9,951,273	3,501,948	5,879,830	7,068,122	9,323,546
HVAC	9,320,249	15,433,409	16,045,034	16,535,592	16,624,714	14,800,485	14,264,563	12,824,870	12,896,161	12,554,133	12,069,699	12,928,218
Compressed Air	2,139,099	2,921,454	3,298,144	3,687,530	3,708,423	3,239,897	3,204,602	3,383,175	3,566,859	3,598,257	3,431,491	3,480,593
Water Heating	376,110	432,539	435,954	439,238	173,040	170,814	166,788	167,629	169,221	167,148	227,054	229,389
Ventilation	1,055,856	5,761,365	7,054,414	7,920,801	1,822,341	1,743,782	1,665,725	1,651,737	1,665,439	1,608,462	1,725,233	1,803,713
Cooking	529,885	875,823	910,773	938,849	924,472	878,395	835,287	829,075	833,790	802,271	811,393	945,123
Pools	179,302	293,472	305,615	315,462	311,603	298,953	249,232	250,162	251,103	207,576	461,566	481,033
Other	421,161	701,384	728,586	750,269	726,533	603,080	561,186	556,649	559,447	530,399	451,958	471,044
Machine Drive	2,915,557	3,349,209	3,452,721	3,557,452	3,663,806	3,830,216	3,940,873	4,053,875	4,169,835	4,289,217	4,473,563	4,600,886
Process Cooling & Heating	1,000,425	1,141,261	1,151,652	1,161,648	1,171,388	1,181,059	1,190,439	1,199,788	1,209,242	1,218,890	1,229,651	1,239,718
Agriculture	44,326	50,715	51,155	51,577	51,989	52,401	52,797	53,193	53,592	54,000	72,475	72,975
Overall Program (Res + C&I)	**$98,598,600**	**$128,519,864**	**$134,648,186**	**$139,874,377**	**$133,720,660**	**$128,157,798**	**$129,442,205**	**$128,709,819**	**$125,756,152**	**$131,005,988**	**$129,407,065**	**$129,337,024**
Pilots	5,666,586	7,386,199	7,738,401	8,038,757	7,685,095	7,365,391	7,439,207	7,397,116	7,227,365	7,529,080	7,437,188	7,433,162
Education	3,399,952	4,431,719	4,643,041	4,823,254	4,611,057	4,419,234	4,463,524	4,438,270	4,336,419	4,517,448	4,462,313	4,459,897
EM&V	5,666,586	7,386,199	7,738,401	8,038,757	7,685,095	7,365,391	7,439,207	7,397,116	7,227,365	7,529,080	7,437,188	7,433,162
Performance Incentive	22,666,345	29,544,796	30,953,606	32,155,029	30,740,382	29,461,563	29,756,829	29,588,464	28,909,460	30,116,319	29,748,751	29,732,649
Total Spend	**$135,998,068**	**$177,268,778**	**$185,721,636**	**$192,930,175**	**$184,442,289**	**$176,769,377**	**$178,540,972**	**$177,530,784**	**$173,456,762**	**$180,697,915**	**$178,492,504**	**$178,395,896**

DTE Electric Company

WP KLB-5 EWR Model 1.75% Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
187,067	**190,678**	**190,751**	**172,412**	**166,856**	**176,869**	**195,102**	**186,257**	**186,177**	**186,171**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
20,323	22,461	21,318	17,241	16,686	17,687	19,510	18,626	18,618	18,617
88,809	88,894	89,506	87,907	89,319	96,001	108,489	99,840	99,840	99,840
27,789	28,572	28,420	7,185	2,086	2,211	2,439	5,337	5,284	5,280
1,871	1,907	1,908	1,724	1,669	1,769	1,951	1,863	1,862	1,862
14,030	14,301	14,306	12,931	12,514	13,265	14,633	13,969	13,963	13,963
468	477	1,475	431	417	442	488	466	465	465
28,060	28,602	28,613	25,862	25,028	26,530	29,265	27,939	27,927	27,926
549,584	**545,584**	**544,921**	**563,404**	**568,818**	**558,620**	**540,413**	**548,796**	**548,561**	**548,544**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
154,656	146,257	140,783	106,055	113,556	131,181	109,116	116,216	116,025	116,011
26,655	26,461	26,429	27,325	27,588	27,093	26,210	26,617	26,605	26,604
43,967	43,647	43,594	45,072	45,505	44,690	43,233	43,904	43,885	43,884
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,409	1,422	1,397	1,351	1,372	1,371	1,371
10,992	10,912	10,898	11,268	11,376	11,172	10,808	10,976	10,971	10,971
2,748	2,728	2,725	2,817	2,844	2,793	2,702	2,744	2,743	2,743
1,374	1,364	1,362	1,409	1,422	1,321	1,134	1,050	1,050	1,050
1,374	1,364	1,362	1,409	1,422	1,397	1,351	1,372	1,371	1,371
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	14,085	14,220	13,965	13,510	13,720	13,714	13,714
551	551	551	845	853	838	811	823	823	823
736,651	**736,262**	**735,673**	**735,816**	**735,674**	**735,489**	**735,515**	**735,053**	**734,738**	**734,716**
40,016	39,998	39,972	39,977	39,969	39,956	39,962	39,950	39,933	39,933
24,009	23,999	23,983	23,986	23,982	23,973	23,977	23,970	23,960	23,960
800,676	**800,259**	**799,628**	**799,779**	**799,625**	**799,418**	**799,455**	**798,972**	**798,631**	**798,608**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$43,283,608	**$44,905,118**	**$45,608,502**	**$37,987,892**	**$37,334,142**	**$40,282,452**	**$47,205,268**	**$43,051,716**	**$43,506,379**	**$43,995,930**
2,513,629	2,441,002	2,367,804	4,571,450	4,522,744	4,444,998	4,294,785	4,227,462	4,274,585	4,322,680
7,102,290	7,951,752	7,744,523	6,399,049	6,320,013	6,808,729	7,609,967	7,371,448	7,416,448	7,465,370
14,746,587	14,705,910	15,062,942	15,269,002	16,755,632	18,616,612	23,718,434	19,190,107	19,448,345	19,711,913
9,297,278	9,874,170	9,998,369	2,558,479	747,016	796,076	883,512	1,952,781	1,947,125	1,959,683
857,607	860,466	856,367	767,942	734,818	766,113	852,712	808,996	813,465	818,355
5,159,833	5,327,215	5,402,533	4,910,188	4,792,992	5,114,645	5,650,404	5,422,572	5,456,368	5,493,063
166,863	171,154	532,942	156,751	152,695	162,934	180,943	173,919	175,049	176,272
3,439,522	3,573,450	3,643,022	3,355,031	3,308,232	3,572,344	4,014,512	3,904,431	3,974,993	4,048,593
$93,317,787	**$94,055,736**	**$94,421,383**	**$101,198,719**	**$101,751,602**	**$95,809,864**	**$94,870,423**	**$97,390,639**	**$97,967,773**	**$98,575,350**
47,004,838	47,317,635	48,370,289	50,795,793	49,318,879	41,818,323	44,116,680	44,294,761	44,476,477	44,661,944
15,060,078	13,895,430	13,375,242	9,761,993	11,515,889	13,005,883	10,516,476	11,666,075	11,774,464	11,902,048
3,166,616	3,378,124	3,924,198	4,201,589	3,758,208	3,738,010	3,784,117	3,788,324	3,815,680	3,845,138
14,552,165	14,641,173	13,589,236	16,845,838	17,253,158	17,289,565	16,758,266	17,861,061	17,901,215	17,949,453
3,530,717	4,682,262	4,870,792	5,537,605	5,565,595	5,471,661	5,185,652	5,002,127	5,069,859	5,138,989
232,107	234,883	217,276	235,356	255,372	252,224	245,417	251,884	258,492	260,009
1,968,340	1,964,907	1,981,825	1,944,976	1,977,498	1,954,708	1,902,980	1,947,340	1,958,456	1,970,593
919,948	915,830	917,345	951,232	963,229	948,821	920,723	937,934	940,520	943,540
315,400	314,393	300,228	267,672	268,043	295,689	274,866	243,428	244,571	245,738
512,137	509,699	510,394	600,984	608,187	598,714	580,614	575,718	580,987	582,494
4,731,963	4,866,911	5,018,836	8,328,087	8,508,215	8,693,305	8,883,504	9,078,947	9,188,924	9,301,171
1,249,993	1,260,484	1,271,187	1,623,982	1,653,868	1,638,528	1,599,254	1,638,705	1,652,941	1,668,135
73,485	74,006	74,537	103,612	105,464	104,432	101,876	104,335	105,187	106,098
$136,601,395	**$138,960,854**	**$140,029,884**	**$139,186,611**	**$139,085,744**	**$136,092,316**	**$142,075,691**	**$140,442,355**	**$141,474,152**	**$142,571,280**
7,850,655	7,986,256	8,047,695	7,999,231	7,993,434	7,821,397	8,165,270	8,071,400	8,130,698	8,193,752
4,710,393	4,791,754	4,828,617	4,799,538	4,796,060	4,692,838	4,899,162	4,842,840	4,878,419	4,916,251
7,850,655	7,986,256	8,047,695	7,999,231	7,993,434	7,821,397	8,165,270	8,071,400	8,130,698	8,193,752
31,402,620	31,945,024	32,190,778	31,996,922	31,973,734	31,285,590	32,661,078	32,285,599	32,522,794	32,775,007
$188,415,718	**$191,670,144**	**$193,144,668**	**$191,981,533**	**$191,842,406**	**$187,713,539**	**$195,966,470**	**$193,713,593**	**$195,136,761**	**$196,650,041**

DTE Electric Company

WP KLB-6 EWR Model 1.75%_Flat Costs High: Output

Case No: U-20471
Workpaper: KLB-6
Page: 1 of 2
Witness: K. L. Bilyeu

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**193,810**	**177,489**	**184,815**	**211,794**	**236,715**	**239,923**	**236,814**	**255,672**	**250,613**	**230,577**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	25,736	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	34,369	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,667	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	2,134	1,938	1,775	1,848	2,118	2,367	2,399	2,368	2,557	2,506	2,306
HVAC Equipment	17,476	16,005	17,393	33,965	29,980	42,865	50,266	40,753	18,549	38,292	30,884	42,600
Miscellaneous	560	533	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	38,411	29,071	26,623	27,722	31,769	35,507	35,988	35,522	38,351	37,592	34,587
Commerical & Industrial	**387,974**	**538,871**	**558,765**	**574,402**	**564,090**	**534,553**	**507,015**	**501,960**	**503,516**	**483,213**	**487,400**	**506,744**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	117,561	117,561	117,561	124,250	98,893	89,326	78,192	31,237	49,818	60,559	81,054
HVAC	31,038	43,110	44,701	45,952	45,127	42,764	40,561	40,157	40,281	38,657	38,992	40,540
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,268	1,255	1,259	1,208	2,941	2,937
Ventilation	7,759	36,326	44,218	49,369	11,282	10,691	10,140	10,039	10,070	9,664	9,748	10,135
Cooking	1,940	2,694	2,794	2,872	2,820	2,673	2,535	2,510	2,518	2,416	2,437	2,534
Pools	970	1,347	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,219	1,267
Other	970	1,347	1,397	1,436	1,410	1,336	1,268	1,255	1,259	1,208	1,219	1,267
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**752,267**	**752,574**	**751,891**	**748,905**	**746,348**	**743,730**	**741,883**	**740,330**	**738,885**	**738,013**	**737,321**
Pilots	35,143	40,884	40,901	40,864	40,701	40,562	40,420	40,317	40,230	40,148	40,094	40,054
Education	21,086	24,530	24,540	24,518	24,421	24,337	24,252	24,190	24,138	24,089	24,056	24,032
Total Savings	**702,851**	**817,681**	**818,016**	**817,273**	**814,027**	**811,247**	**808,401**	**806,390**	**804,699**	**803,122**	**802,163**	**801,407**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$38,650,013**	**$42,693,538**	**$46,372,210**	**$47,309,183**	**$55,293,119**	**$61,715,576**	**$61,158,086**	**$57,655,630**	**$66,079,848**	**$68,325,923**	**$63,839,216**
Lighting	15,192,489	13,879,077	10,548,303	6,134,824	6,078,882	6,030,399	5,993,008	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	7,129,449	10,087,983	10,304,597	10,612,124	10,961,944	11,374,329	11,894,044	12,396,191	12,806,373	10,118,963	10,190,306
Electronics	3,741,531	5,532,539	6,674,669	7,583,032	8,729,315	9,855,599	11,413,096	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	891,964	4,458,193	5,232,561	6,038,878	6,859,587	7,727,301	8,705,896	9,672,171	10,461,415	10,371,994	10,368,453
HVAC Shell	1,153,480	1,009,194	918,075	843,459	882,627	1,017,683	1,145,461	1,170,413	1,165,312	1,269,271	1,265,068	1,180,773
HVAC Equipment	5,124,891	6,170,789	6,741,273	13,169,490	11,651,481	16,712,987	19,683,586	16,057,210	7,350,800	15,225,985	12,483,547	17,398,551
Miscellaneous	161,295	201,325	294,781	326,703	361,148	396,832	435,205	479,114	522,574	558,201	595,627	607,608
Cross-Cutting	5,071,274	3,835,676	2,970,260	2,777,545	2,954,728	3,458,086	3,943,589	4,077,699	4,105,187	4,521,053	4,519,012	4,238,941
Commerical & Industrial	**$58,998,406**	**$105,845,762**	**$109,014,232**	**$111,477,704**	**$103,097,919**	**$88,171,853**	**$82,878,000**	**$82,396,012**	**$82,306,033**	**$79,707,297**	**$75,469,881**	**$79,925,812**
Lighting	30,093,471	41,089,903	41,278,213	41,399,761	37,726,412	29,325,757	27,252,671	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	10,642,638	10,754,030	10,861,181	15,684,802	15,798,594	14,753,327	14,888,256	20,597,098	16,851,715	15,927,971	15,611,940
Refrigeration	2,290,235	18,770,255	18,880,385	18,986,324	16,514,530	12,688,873	11,321,111	11,133,247	3,885,877	6,536,513	7,842,861	10,323,392
HVAC	9,320,249	17,880,557	18,582,521	19,144,114	19,247,526	17,111,078	16,490,048	14,793,228	14,870,128	14,473,978	13,895,368	14,886,827
Compressed Air	2,139,099	3,253,762	3,642,154	4,043,241	4,030,827	3,476,255	3,417,165	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	485,500	488,914	492,199	193,859	191,543	187,103	187,996	189,652	187,408	244,170	246,482
Ventilation	1,055,856	6,545,175	8,008,502	8,986,048	2,066,190	1,976,194	1,886,728	1,869,506	1,883,884	1,818,411	1,953,616	2,041,305
Cooking	529,885	1,013,106	1,053,123	1,085,183	1,068,179	1,014,577	964,454	956,953	962,066	925,373	935,562	1,091,732
Pools	179,302	336,624	350,360	361,459	356,875	342,295	285,274	286,204	287,145	237,294	533,510	555,833
Other	421,161	816,521	847,972	872,997	845,027	700,092	651,100	645,666	648,741	614,762	522,206	544,081
Machine Drive	2,915,557	3,683,523	3,789,025	3,895,746	4,004,090	4,176,911	4,289,557	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,271,543	1,281,934	1,291,930	1,301,670	1,311,341	1,320,721	1,330,070	1,339,524	1,349,171	1,360,026	1,370,092
Agriculture	44,326	56,658	57,097	57,520	57,932	58,344	58,740	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$144,495,775**	**$151,707,770**	**$157,849,914**	**$150,407,102**	**$143,464,972**	**$144,593,576**	**$143,554,098**	**$139,961,663**	**$145,787,145**	**$143,795,804**	**$143,765,028**
Pilots	5,666,586	8,304,355	8,718,837	9,071,834	8,644,086	8,245,113	8,309,976	8,250,236	8,043,774	8,378,572	8,264,127	8,262,358
Education	3,399,952	4,982,613	5,231,302	5,443,100	5,186,452	4,947,068	4,985,985	4,950,141	4,826,264	5,027,143	4,958,476	4,957,415
EM&V	5,666,586	8,304,355	8,718,837	9,071,834	8,644,086	8,245,113	8,309,976	8,250,236	8,043,774	8,378,572	8,264,127	8,262,358
Performance Incentive	22,666,345	33,217,420	34,875,349	36,287,336	34,576,345	32,980,453	33,239,902	33,000,942	32,175,095	33,514,286	33,056,507	33,049,432
Total Spend	**$135,998,068**	**$199,304,517**	**$209,252,096**	**$217,724,019**	**$207,458,072**	**$197,882,720**	**$199,439,415**	**$198,005,653**	**$193,050,569**	**$201,085,717**	**$198,339,040**	**$198,296,590**

DTE Electric Company

WP KLB-6 EWR Model 1.75%_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
187,067	**190,678**	**190,751**	**172,412**	**166,856**	**176,869**	**195,102**	**186,257**	**186,177**	**186,171**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
20,323	22,461	21,318	17,241	16,686	17,687	19,510	18,626	18,618	18,617
88,809	88,894	89,506	87,907	89,319	96,001	108,489	99,840	99,840	99,840
27,789	28,572	28,420	7,185	2,086	2,211	2,439	5,337	5,284	5,280
1,871	1,907	1,908	1,724	1,669	1,769	1,951	1,863	1,862	1,862
14,030	14,301	14,306	12,931	12,514	13,265	14,633	13,969	13,963	13,963
468	477	1,475	431	417	442	488	466	465	465
28,060	28,602	28,613	25,862	25,028	26,530	29,265	27,939	27,927	27,926
549,584	**545,584**	**544,921**	**563,404**	**568,818**	**558,620**	**540,413**	**548,796**	**548,561**	**548,544**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
154,656	146,257	140,783	106,055	113,556	131,181	109,116	116,216	116,025	116,011
26,655	26,461	26,429	27,325	27,588	27,093	26,210	26,617	26,605	26,604
43,967	43,647	43,594	45,072	45,505	44,690	43,233	43,904	43,885	43,884
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,409	1,422	1,397	1,351	1,372	1,371	1,371
10,992	10,912	10,898	11,268	11,376	11,172	10,808	10,976	10,971	10,971
2,748	2,728	2,725	2,817	2,844	2,793	2,702	2,744	2,743	2,743
1,374	1,364	1,362	1,409	1,422	1,321	1,134	1,050	1,050	1,050
1,374	1,364	1,362	1,409	1,422	1,397	1,351	1,372	1,371	1,371
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	14,085	14,220	13,965	13,510	13,720	13,714	13,714
551	551	551	845	853	838	811	823	823	823
736,651	**736,262**	**735,673**	**735,816**	**735,674**	**735,489**	**735,515**	**735,053**	**734,738**	**734,716**
40,016	39,998	39,972	39,977	39,969	39,956	39,962	39,950	39,933	39,933
24,009	23,999	23,983	23,986	23,982	23,973	23,977	23,970	23,960	23,960
800,676	**800,259**	**799,628**	**799,779**	**799,625**	**799,418**	**799,455**	**798,972**	**798,631**	**798,608**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$47,311,518	**$49,073,958**	**$49,822,962**	**$41,155,069**	**$40,429,695**	**$43,612,729**	**$51,282,187**	**$46,505,182**	**$46,956,872**	**$47,446,213**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370
7,963,405	8,912,604	8,682,721	7,174,636	7,086,027	7,632,431	8,527,560	8,257,902	8,302,523	8,351,418
15,634,918	15,550,229	15,922,036	16,160,360	17,842,785	19,851,062	25,538,873	20,355,334	20,613,572	20,877,139
10,401,650	11,053,914	11,191,546	2,862,598	835,182	889,330	986,258	2,178,653	2,170,763	2,183,162
972,846	974,757	969,150	868,096	829,564	863,526	960,656	910,321	914,747	919,634
5,799,614	5,985,642	6,068,363	5,511,449	5,376,852	5,733,851	6,328,527	6,068,705	6,102,224	6,138,899
187,283	191,968	597,345	175,572	170,909	182,241	202,240	194,251	195,372	196,595
3,504,940	3,640,720	3,710,793	3,416,610	3,368,113	3,635,999	4,084,942	3,971,863	4,042,396	4,115,995
$105,319,173	**$106,128,863**	**$106,471,814**	**$114,190,883**	**$114,693,767**	**$107,692,359**	**$106,651,175**	**$109,435,808**	**$110,011,554**	**$110,618,900**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614
16,460,854	15,134,540	14,544,003	10,568,646	12,547,130	14,120,988	11,370,617	12,636,015	12,743,025	12,870,495
3,508,807	3,754,804	4,393,014	4,707,024	4,178,242	4,153,941	4,211,290	4,207,493	4,234,670	4,264,115
16,762,877	16,862,914	15,618,363	19,429,319	19,896,713	19,938,655	19,318,720	20,601,700	20,640,681	20,688,836
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112
249,200	251,976	234,152	264,724	287,902	284,172	276,323	283,480	290,997	292,513
2,226,365	2,221,156	2,239,315	2,190,878	2,226,188	2,199,154	2,139,578	2,188,160	2,199,173	2,211,302
1,059,959	1,054,822	1,056,169	1,094,764	1,108,140	1,091,135	1,058,398	1,077,745	1,080,271	1,083,287
359,892	358,562	341,678	302,742	302,809	335,985	312,959	276,553	277,697	278,863
591,349	588,333	588,933	694,874	702,979	691,807	670,672	664,461	670,402	671,906
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354
1,380,368	1,390,859	1,401,561	1,788,907	1,820,377	1,802,051	1,757,448	1,799,353	1,813,520	1,828,710
81,974	82,495	83,026	114,597	116,555	115,324	112,413	115,035	115,882	116,793
$152,630,691	**$155,202,821**	**$156,294,776**	**$155,345,951**	**$155,123,462**	**$151,305,089**	**$157,933,362**	**$155,940,989**	**$156,968,426**	**$158,065,113**
8,771,879	8,919,702	8,982,458	8,927,928	8,915,142	8,695,695	9,076,630	8,962,126	9,021,174	9,084,202
5,263,127	5,351,821	5,389,475	5,356,757	5,349,085	5,217,417	5,445,978	5,377,275	5,412,704	5,450,521
8,771,879	8,919,702	8,982,458	8,927,928	8,915,142	8,695,695	9,076,630	8,962,126	9,021,174	9,084,202
35,087,515	35,678,809	35,929,834	35,711,713	35,660,566	34,782,779	36,306,520	35,848,503	36,084,696	36,336,808
$210,525,091	**$214,072,857**	**$215,579,002**	**$214,270,278**	**$213,963,396**	**$208,696,674**	**$217,839,120**	**$215,091,020**	**$216,508,174**	**$218,020,845**

DTE Electric Company

WP KLB-7 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Flat Costs High: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**198,153**	**193,810**	**177,489**	**184,815**	**211,794**	**236,714**	**239,922**	**236,809**	**255,666**	**250,607**	**230,572**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	19,815	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	29,315	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,477	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	1,982	1,938	1,775	1,848	2,118	2,367	2,399	2,368	2,557	2,506	2,306
HVAC Equipment	17,476	14,861	17,393	33,965	29,980	42,865	50,266	40,753	18,545	38,287	30,879	42,596
Miscellaneous	560	495	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	35,668	29,071	26,623	27,722	31,769	35,507	35,988	35,521	38,350	37,591	34,586
Commerical & Industrial	**387,974**	**500,380**	**558,765**	**574,402**	**564,090**	**534,553**	**507,014**	**501,959**	**503,505**	**483,202**	**487,389**	**506,733**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	108,853	117,561	117,561	124,250	98,892	89,325	78,192	31,228	49,809	60,549	81,044
HVAC	31,038	40,030	44,701	45,952	45,127	42,764	40,561	40,157	40,280	38,656	38,991	40,539
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,268	1,255	1,259	1,208	2,941	2,937
Ventilation	7,759	10,008	44,218	49,369	11,282	10,691	10,140	10,039	10,070	9,664	9,748	10,135
Cooking	1,940	2,502	2,794	2,872	2,820	2,673	2,535	2,510	2,518	2,416	2,437	2,534
Pools	970	1,251	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,218	1,267
Other	970	1,251	1,397	1,436	1,410	1,336	1,268	1,255	1,259	1,208	1,218	1,267
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**698,534**	**752,574**	**751,891**	**748,905**	**746,346**	**743,728**	**741,882**	**740,314**	**738,868**	**737,996**	**737,305**
Pilots	35,143	37,964	40,901	40,864	40,701	40,562	40,420	40,318	40,231	40,149	40,095	40,055
Education	21,086	22,778	24,540	24,518	24,421	24,337	24,252	24,191	24,139	24,089	24,057	24,033
Total Savings	**702,851**	**759,276**	**818,016**	**817,273**	**814,027**	**811,246**	**808,399**	**806,390**	**804,684**	**803,107**	**802,147**	**801,392**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$35,331,396**	**$42,693,538**	**$46,372,210**	**$47,309,152**	**$55,292,990**	**$61,715,325**	**$61,157,961**	**$57,653,829**	**$66,077,781**	**$68,323,810**	**$63,837,296**
Lighting	15,192,489	13,879,077	10,548,303	6,134,824	6,078,882	6,030,399	5,993,008	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	5,489,374	10,087,983	10,304,597	10,612,124	10,961,944	11,374,329	11,894,044	12,396,191	12,806,373	10,118,963	10,190,306
Electronics	3,741,531	4,718,922	6,674,669	7,583,032	8,729,315	9,855,599	11,413,096	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	828,252	4,458,193	5,232,561	6,038,878	6,859,587	7,727,301	8,705,896	9,672,171	10,461,415	10,371,994	10,368,453
HVAC Shell	1,153,480	937,109	918,075	843,459	882,627	1,017,682	1,145,458	1,170,411	1,165,288	1,269,242	1,265,039	1,180,746
HVAC Equipment	5,124,891	5,730,018	6,741,273	13,169,490	11,651,451	16,712,865	19,683,351	16,057,093	7,349,112	15,224,049	12,481,569	17,396,753
Miscellaneous	161,295	186,945	294,781	326,703	361,148	396,832	435,205	479,114	522,574	558,201	595,627	607,608
Cross-Cutting	5,071,274	3,561,699	2,970,260	2,777,545	2,954,727	3,458,080	3,943,577	4,077,693	4,105,099	4,520,950	4,518,907	4,238,845
Commerical & Industrial	**$58,998,406**	**$98,281,437**	**$109,014,232**	**$111,477,704**	**$103,097,875**	**$88,171,709**	**$82,877,766**	**$82,395,891**	**$82,304,442**	**$79,705,609**	**$75,468,161**	**$79,924,073**
Lighting	30,093,471	41,089,903	41,278,213	41,399,761	37,726,412	29,325,757	27,252,671	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	10,642,638	10,754,030	10,861,181	15,684,802	15,798,594	14,753,327	14,888,256	20,597,098	16,851,715	15,927,971	15,611,940
Refrigeration	2,290,235	17,379,860	18,880,385	18,986,324	16,514,497	12,688,766	11,320,939	11,133,153	3,884,684	6,535,234	7,841,555	10,322,087
HVAC	9,320,249	16,603,374	18,582,521	19,144,114	19,247,517	17,111,048	16,489,998	14,793,207	14,869,810	14,473,650	13,895,045	14,886,488
Compressed Air	2,139,099	3,253,762	3,642,154	4,043,241	4,030,827	3,476,255	3,417,165	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	485,500	488,914	492,199	193,859	191,543	187,102	187,996	189,648	187,403	244,170	246,482
Ventilation	1,055,856	1,803,160	8,008,502	8,986,048	2,066,189	1,976,190	1,886,723	1,869,503	1,883,844	1,818,369	1,953,571	2,041,259
Cooking	529,885	940,741	1,053,123	1,085,183	1,068,179	1,014,576	964,451	956,952	962,045	925,352	935,541	1,091,707
Pools	179,302	312,580	350,360	361,459	356,874	342,294	285,274	286,204	287,145	237,294	533,497	555,820
Other	421,161	758,198	847,972	872,997	845,027	700,091	651,098	645,665	648,727	614,748	522,194	544,068
Machine Drive	2,915,557	3,683,523	3,789,025	3,895,746	4,004,090	4,176,911	4,289,557	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,271,543	1,281,934	1,291,930	1,301,670	1,311,341	1,320,721	1,330,070	1,339,524	1,349,171	1,360,026	1,370,092
Agriculture	44,326	56,658	57,097	57,520	57,932	58,344	58,740	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$133,612,833**	**$151,707,770**	**$157,849,914**	**$150,407,027**	**$143,464,699**	**$144,593,091**	**$143,553,851**	**$139,958,272**	**$145,783,390**	**$143,791,971**	**$143,761,368**
Pilots	5,666,586	7,678,898	8,718,837	9,071,834	8,644,082	8,245,098	8,309,948	8,250,221	8,043,579	8,378,356	8,263,906	8,262,148
Education	3,399,952	4,607,339	5,231,302	5,443,100	5,186,449	4,947,059	4,985,969	4,950,133	4,826,147	5,027,013	4,958,344	4,957,289
EM&V	5,666,586	7,678,898	8,718,837	9,071,834	8,644,082	8,245,098	8,309,948	8,250,221	8,043,579	8,378,356	8,263,906	8,262,148
Performance Incentive	22,666,345	30,715,594	34,875,349	36,287,336	34,576,328	32,980,390	33,239,791	33,000,885	32,174,315	33,513,423	33,055,625	33,048,590
Total Spend	**$135,998,068**	**$184,293,563**	**$209,252,096**	**$217,724,019**	**$207,457,968**	**$197,882,343**	**$199,438,747**	**$198,005,312**	**$193,045,892**	**$201,080,537**	**$198,333,753**	**$198,291,542**

DTE Electric Company

WP KLB-7 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
187,063	**190,672**	**190,744**	**172,406**	**166,851**	**176,868**	**195,103**	**186,257**	**186,178**	**186,177**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
20,320	22,456	21,312	17,241	16,685	17,687	19,510	18,626	18,618	18,618
88,809	88,894	89,506	87,907	89,315	96,000	108,489	99,840	99,840	99,840
27,789	28,572	28,420	7,181	2,086	2,211	2,439	5,337	5,285	5,284
1,871	1,907	1,907	1,724	1,669	1,769	1,951	1,863	1,862	1,862
14,030	14,300	14,306	12,930	12,514	13,265	14,633	13,969	13,963	13,963
468	477	1,475	431	417	442	488	466	465	465
28,059	28,601	28,612	25,861	25,028	26,530	29,265	27,939	27,927	27,927
549,571	**545,564**	**544,902**	**563,387**	**568,801**	**558,616**	**540,414**	**548,796**	**548,563**	**548,561**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
154,645	146,241	140,767	106,040	113,543	131,178	109,117	116,217	116,027	116,025
26,654	26,460	26,428	27,324	27,587	27,093	26,210	26,617	26,605	26,605
43,966	43,645	43,592	45,071	45,504	44,689	43,233	43,904	43,885	43,885
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,408	1,422	1,397	1,351	1,372	1,371	1,371
10,991	10,911	10,898	11,268	11,376	11,172	10,808	10,976	10,971	10,971
2,748	2,728	2,725	2,817	2,844	2,793	2,702	2,744	2,743	2,743
1,374	1,364	1,362	1,408	1,422	1,321	1,134	1,050	1,050	1,050
1,374	1,364	1,362	1,408	1,422	1,397	1,351	1,372	1,371	1,371
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	14,085	14,220	13,965	13,510	13,720	13,714	13,714
551	551	551	845	853	838	811	823	823	823
736,634	**736,236**	**735,646**	**735,793**	**735,652**	**735,483**	**735,516**	**735,053**	**734,741**	**734,738**
40,016	39,999	39,973	39,979	39,972	39,956	39,962	39,950	39,933	39,933
24,010	23,999	23,984	23,988	23,983	23,973	23,977	23,970	23,960	23,960
800,659	**800,234**	**799,603**	**799,760**	**799,607**	**799,413**	**799,455**	**798,973**	**798,634**	**798,631**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$47,309,957	**$49,071,548**	**$49,820,454**	**$41,153,145**	**$40,428,557**	**$43,612,436**	**$51,282,245**	**$46,505,225**	**$46,957,152**	**$47,448,392**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370
7,962,089	8,910,574	8,680,597	7,174,416	7,085,822	7,632,378	8,527,570	8,257,907	8,302,556	8,351,675
15,634,918	15,550,229	15,922,036	16,160,360	17,842,158	19,850,898	25,538,907	20,355,334	20,613,572	20,877,139
10,401,650	11,053,914	11,191,546	2,861,201	835,158	889,324	986,259	2,178,685	2,170,965	2,184,734
972,823	974,723	969,116	868,069	829,540	863,520	960,657	910,322	914,751	919,662
5,799,477	5,985,431	6,068,146	5,511,280	5,376,696	5,733,811	6,328,535	6,068,709	6,102,248	6,139,088
187,279	191,961	597,345	175,566	170,904	182,240	202,240	194,251	195,373	196,601
3,504,858	3,640,592	3,710,660	3,416,505	3,368,016	3,635,974	4,084,946	3,971,866	4,042,413	4,116,122
$105,317,437	**$106,126,318**	**$106,469,255**	**$114,188,543**	**$114,691,403**	**$107,691,815**	**$106,651,261**	**$109,435,857**	**$110,011,873**	**$110,621,389**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614
16,459,695	15,132,868	14,542,310	10,567,245	12,545,653	14,120,652	11,370,670	12,636,046	12,743,221	12,872,023
3,508,724	3,754,672	4,392,857	4,706,880	4,178,121	4,153,912	4,211,294	4,207,495	4,234,686	4,264,247
16,762,483	16,862,321	15,617,805	19,428,722	19,896,137	19,938,518	19,318,742	20,601,713	20,640,763	20,689,473
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112
249,200	251,976	234,152	264,716	287,894	284,170	276,323	283,481	290,998	292,522
2,226,312	2,221,078	2,239,235	2,190,811	2,226,123	2,199,139	2,139,580	2,188,162	2,199,182	2,211,370
1,059,934	1,054,785	1,056,131	1,094,731	1,108,108	1,091,127	1,058,399	1,077,745	1,080,275	1,083,320
359,884	358,549	341,666	302,733	302,801	335,985	312,959	276,553	277,697	278,863
591,335	588,313	588,912	694,853	702,959	691,802	670,673	664,462	670,405	671,927
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354
1,380,368	1,390,859	1,401,561	1,788,852	1,820,324	1,802,039	1,757,450	1,799,355	1,813,527	1,828,766
81,974	82,495	83,026	114,593	116,551	115,323	112,413	115,035	115,883	116,797
$152,627,394	**$155,197,866**	**$156,289,709**	**$155,341,689**	**$155,119,960**	**$151,304,251**	**$157,933,506**	**$155,941,083**	**$156,969,026**	**$158,069,781**
8,771,689	8,919,418	8,982,167	8,927,683	8,914,940	8,695,647	9,076,638	8,962,131	9,021,208	9,084,470
5,263,014	5,351,651	5,389,300	5,356,610	5,348,964	5,217,388	5,445,983	5,377,279	5,412,725	5,450,682
8,771,689	8,919,418	8,982,167	8,927,683	8,914,940	8,695,647	9,076,638	8,962,131	9,021,208	9,084,470
35,086,757	35,677,670	35,928,669	35,710,733	35,659,761	34,782,586	36,306,553	35,848,525	36,084,833	36,337,881
$210,520,543	**$214,066,022**	**$215,572,013**	**$214,264,398**	**$213,958,566**	**$208,695,518**	**$217,839,318**	**$215,091,149**	**$216,509,001**	**$218,027,284**

DTE Electric Company

WP KLB-8 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Flat Costs Low: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**198,153**	**193,810**	**177,489**	**184,815**	**211,794**	**236,714**	**239,922**	**236,809**	**255,666**	**250,607**	**230,572**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	19,815	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	29,315	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,477	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	1,982	1,938	1,775	1,848	2,118	2,367	2,399	2,368	2,557	2,506	2,306
HVAC Equipment	17,476	14,861	17,393	33,965	29,980	42,865	50,266	40,753	18,545	38,287	30,879	42,596
Miscellaneous	560	495	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	35,668	29,071	26,623	27,722	31,769	35,507	35,988	35,521	38,350	37,591	34,586
Commerical & Industrial	**387,974**	**500,380**	**558,765**	**574,402**	**564,090**	**534,553**	**507,014**	**501,959**	**503,505**	**483,202**	**487,389**	**506,733**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	108,853	117,561	117,561	124,250	98,892	89,325	78,192	31,228	49,809	60,549	81,044
HVAC	31,038	40,030	44,701	45,952	45,127	42,764	40,561	40,157	40,280	38,656	38,991	40,539
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,268	1,255	1,259	1,208	2,941	2,937
Ventilation	7,759	10,008	44,218	49,369	11,282	10,691	10,140	10,039	10,070	9,664	9,748	10,135
Cooking	1,940	2,502	2,794	2,872	2,820	2,673	2,535	2,510	2,518	2,416	2,437	2,534
Pools	970	1,251	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,218	1,267
Other	970	1,251	1,397	1,436	1,410	1,336	1,268	1,255	1,259	1,208	1,218	1,267
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**698,534**	**752,574**	**751,891**	**748,905**	**746,346**	**743,728**	**741,882**	**740,314**	**738,868**	**737,996**	**737,305**
Pilots	35,143	37,964	40,901	40,864	40,701	40,562	40,420	40,318	40,231	40,149	40,095	40,055
Education	21,086	22,778	24,540	24,518	24,421	24,337	24,252	24,191	24,139	24,089	24,057	24,033
Total Savings	**702,851**	**759,276**	**818,016**	**817,273**	**814,027**	**811,246**	**808,399**	**806,390**	**804,684**	**803,107**	**802,147**	**801,392**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$29,860,950**	**$35,031,378**	**$37,287,068**	**$38,257,748**	**$44,728,512**	**$50,075,491**	**$49,922,584**	**$47,521,192**	**$54,146,823**	**$55,721,841**	**$52,099,053**
Lighting	15,192,489	12,136,533	8,828,801	4,737,578	4,719,635	4,709,323	4,710,094	4,736,136	4,750,607	2,467,314	2,250,566	2,148,004
Appliances	7,176,137	4,355,459	8,019,962	8,216,553	8,482,714	8,781,986	9,129,516	9,560,221	9,979,049	10,332,968	7,922,275	7,980,316
Electronics	3,741,531	4,062,029	5,758,710	6,550,910	7,561,206	8,551,149	9,949,215	11,174,210	14,261,053	15,548,181	21,907,812	14,808,675
Water Heating	1,979,097	643,889	3,471,060	4,080,856	4,716,424	5,364,165	6,048,965	6,820,622	7,583,554	8,209,228	8,154,978	8,160,711
HVAC Shell	1,153,480	707,266	694,111	638,687	669,252	772,611	870,568	890,408	887,336	967,393	964,479	900,651
HVAC Equipment	5,124,891	4,395,686	5,180,699	10,142,261	8,990,028	12,918,081	15,238,187	12,447,996	5,705,361	11,838,740	9,709,907	13,547,186
Miscellaneous	161,295	143,684	226,966	251,965	278,979	307,029	337,227	371,805	406,135	434,476	464,312	474,376
Cross-Cutting	5,071,274	3,416,404	2,851,067	2,668,260	2,839,510	3,324,169	3,791,719	3,921,187	3,948,096	4,348,522	4,347,511	4,079,133
Commerical & Industrial	**$58,998,406**	**$74,250,879**	**$82,557,224**	**$84,611,771**	**$78,776,411**	**$68,121,899**	**$64,214,964**	**$63,942,763**	**$64,026,786**	**$62,075,058**	**$59,293,469**	**$62,807,082**
Lighting	30,093,471	30,220,735	30,402,809	30,524,357	27,858,058	21,686,632	20,200,769	20,946,474	21,732,060	20,981,008	17,687,868	18,319,364
Office Equipment	8,632,730	8,745,871	8,857,263	8,964,415	12,718,277	13,129,310	12,285,094	12,420,023	16,979,561	13,927,133	13,379,959	13,105,369
Refrigeration	2,290,235	13,352,337	14,530,660	14,636,598	13,015,643	10,066,450	9,017,055	8,769,225	3,117,060	5,222,124	6,292,336	8,322,647
HVAC	9,320,249	12,058,672	13,507,546	13,927,070	14,001,894	12,489,870	12,039,041	10,856,496	10,921,961	10,634,046	10,243,792	10,969,360
Compressed Air	2,139,099	2,589,147	2,954,135	3,331,819	3,386,019	3,003,539	2,992,038	3,166,419	3,345,910	3,391,118	3,248,480	3,297,582
Water Heating	376,110	379,579	382,993	386,278	152,221	150,084	146,473	147,261	148,788	146,885	209,939	212,296
Ventilation	1,055,856	1,371,289	6,100,326	6,855,554	1,578,490	1,511,367	1,444,716	1,433,965	1,446,964	1,398,481	1,496,815	1,566,086
Cooking	529,885	685,788	768,423	792,515	780,765	742,211	706,118	701,195	705,500	679,152	687,207	798,496
Pools	179,302	232,440	260,870	269,465	266,332	255,610	213,189	214,120	215,060	177,857	389,612	406,225
Other	421,161	544,373	609,199	627,542	608,039	506,068	471,270	467,630	470,143	446,026	381,700	397,998
Machine Drive	2,915,557	3,014,895	3,116,417	3,219,158	3,323,522	3,483,522	3,592,188	3,703,200	3,817,170	3,934,563	4,112,498	4,237,831
Process Cooling & Heating	1,000,425	1,010,980	1,021,371	1,031,366	1,041,106	1,050,777	1,060,157	1,069,506	1,078,960	1,088,608	1,099,277	1,109,343
Agriculture	44,326	44,773	45,212	45,635	46,046	46,458	46,854	47,250	47,649	48,057	63,986	64,486
Overall Program (Res + C&I)	**$98,598,600**	**$104,111,829**	**$117,588,602**	**$121,898,840**	**$117,034,159**	**$112,850,412**	**$114,290,455**	**$113,865,347**	**$111,547,978**	**$116,221,881**	**$115,015,310**	**$114,906,135**
Pilots	5,666,586	5,983,438	6,757,966	7,005,680	6,726,101	6,485,656	6,568,417	6,543,985	6,410,803	6,679,418	6,610,075	6,603,801
Education	3,399,952	3,590,063	4,054,779	4,203,408	4,035,661	3,891,394	3,941,050	3,926,391	3,846,482	4,007,651	3,966,045	3,962,281
EM&V	5,666,586	5,983,438	6,757,966	7,005,680	6,726,101	6,485,656	6,568,417	6,543,985	6,410,803	6,679,418	6,610,075	6,603,801
Performance Incentive	22,666,345	23,933,754	27,031,863	28,022,722	26,904,404	25,942,623	26,273,668	26,175,942	25,643,213	26,717,674	26,440,301	26,415,203
Total Spend	**$135,998,068**	**$143,602,522**	**$162,191,175**	**$168,136,331**	**$161,426,426**	**$155,655,740**	**$157,642,007**	**$157,055,651**	**$153,859,280**	**$160,306,043**	**$158,641,807**	**$158,491,221**

DTE Electric Company

WP KLB-8 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
187,063	**190,672**	**190,744**	**172,406**	**166,851**	**176,868**	**195,103**	**186,257**	**186,178**	**186,177**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
20,320	22,456	21,312	17,241	16,685	17,687	19,510	18,626	18,618	18,618
88,809	88,894	89,506	87,907	89,315	96,000	108,489	99,840	99,840	99,840
27,789	28,572	28,420	7,181	2,086	2,211	2,439	5,337	5,285	5,284
1,871	1,907	1,907	1,724	1,669	1,769	1,951	1,863	1,862	1,862
14,030	14,300	14,306	12,930	12,514	13,265	14,633	13,969	13,963	13,963
468	477	1,475	431	417	442	488	466	465	465
28,059	28,601	28,612	25,861	25,028	26,530	29,265	27,939	27,927	27,927
549,571	**545,564**	**544,902**	**563,387**	**568,801**	**558,616**	**540,414**	**548,796**	**548,563**	**548,561**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
154,645	146,241	140,767	106,040	113,543	131,178	109,117	116,217	116,027	116,025
26,654	26,460	26,428	27,324	27,587	27,093	26,210	26,617	26,605	26,605
43,966	43,645	43,592	45,071	45,504	44,689	43,233	43,904	43,885	43,885
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,408	1,422	1,397	1,351	1,372	1,371	1,371
10,991	10,911	10,898	11,268	11,376	11,172	10,808	10,976	10,971	10,971
2,748	2,728	2,725	2,817	2,844	2,793	2,702	2,744	2,743	2,743
1,374	1,364	1,362	1,408	1,422	1,321	1,134	1,050	1,050	1,050
1,374	1,364	1,362	1,408	1,422	1,397	1,351	1,372	1,371	1,371
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	14,085	14,220	13,965	13,510	13,720	13,714	13,714
551	551	551	845	853	838	811	823	823	823
736,634	**736,236**	**735,646**	**735,793**	**735,652**	**735,483**	**735,516**	**735,053**	**734,741**	**734,738**
40,016	39,999	39,973	39,979	39,972	39,956	39,962	39,950	39,933	39,933
24,010	23,999	23,984	23,988	23,983	23,973	23,977	23,970	23,960	23,960
800,659	**800,234**	**799,603**	**799,760**	**799,607**	**799,413**	**799,455**	**798,973**	**798,634**	**798,631**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$39,254,460	**$40,734,367**	**$41,392,053**	**$34,819,184**	**$34,237,620**	**$36,951,924**	**$43,128,398**	**$39,598,286**	**$40,056,110**	**$40,547,399**
2,180,395	2,117,880	2,054,599	4,157,152	4,125,225	4,065,705	3,936,440	3,886,772	3,933,895	3,981,991
6,240,143	6,989,307	6,804,661	5,623,289	5,553,839	5,984,987	6,692,382	6,484,998	6,530,399	6,579,525
13,858,255	13,861,591	14,203,847	14,377,644	15,667,929	17,382,020	21,898,024	18,024,881	18,283,119	18,546,686
8,192,907	8,694,426	8,805,192	2,253,259	658,831	702,817	780,767	1,726,933	1,723,648	1,737,454
742,351	746,149	743,558	667,768	640,054	668,696	744,768	707,671	712,186	717,099
4,519,946	4,668,623	4,736,533	4,308,794	4,209,010	4,495,409	4,972,286	4,776,443	4,810,532	4,847,376
146,439	150,334	468,540	137,926	134,477	143,626	159,645	153,588	154,726	155,954
3,374,024	3,506,057	3,575,122	3,293,351	3,248,256	3,508,665	3,944,086	3,837,000	3,907,604	3,981,314
$81,315,008	**$81,980,557**	**$82,368,880**	**$88,204,665**	**$88,807,536**	**$83,926,929**	**$83,089,741**	**$85,345,510**	**$85,924,252**	**$86,533,822**
40,182,883	40,476,734	41,404,824	43,487,143	42,265,898	35,879,957	37,863,010	38,041,091	38,222,807	38,408,274
13,658,341	12,654,922	12,205,060	8,954,153	10,483,413	11,890,495	9,662,378	10,696,160	10,806,069	10,934,899
2,824,358	3,001,339	3,455,259	3,696,041	3,338,077	3,322,057	3,356,948	3,369,157	3,396,704	3,426,267
12,341,162	12,418,995	11,559,695	14,261,920	14,609,180	14,640,375	14,197,828	15,120,432	15,161,809	15,210,539
3,347,707	4,328,602	4,495,090	5,121,553	5,154,743	5,086,369	4,856,593	4,702,004	4,769,736	4,838,866
215,014	217,790	200,400	205,983	222,835	220,276	214,511	220,287	225,989	227,512
1,710,275	1,708,597	1,724,273	1,699,021	1,728,757	1,710,250	1,666,383	1,706,521	1,717,746	1,729,936
779,918	776,810	778,494	807,675	818,293	806,502	783,049	798,124	800,772	803,818
270,901	270,215	258,767	232,595	233,269	255,392	236,772	210,302	211,446	212,612
432,916	431,049	431,839	507,079	513,380	505,618	490,556	486,974	491,573	493,096
4,366,918	4,499,876	4,648,318	7,679,865	7,858,002	8,041,103	8,229,312	8,422,764	8,532,742	8,644,989
1,119,619	1,130,110	1,140,812	1,459,013	1,487,316	1,474,994	1,441,061	1,478,058	1,492,368	1,507,607
64,996	65,517	66,048	92,624	94,371	93,540	91,340	93,635	94,492	95,406
$120,569,468	**$122,714,924**	**$123,760,932**	**$123,023,849**	**$123,045,157**	**$120,878,853**	**$126,218,139**	**$124,943,796**	**$125,980,362**	**$127,081,221**
6,929,280	7,052,582	7,112,697	7,070,336	7,071,561	6,947,061	7,253,916	7,180,678	7,240,251	7,303,518
4,157,568	4,231,549	4,267,618	4,242,202	4,242,936	4,168,236	4,352,350	4,308,407	4,344,150	4,382,111
6,929,280	7,052,582	7,112,697	7,070,336	7,071,561	6,947,061	7,253,916	7,180,678	7,240,251	7,303,518
27,717,119	28,210,327	28,450,789	28,281,345	28,286,243	27,788,242	29,015,664	28,722,712	28,961,003	29,214,074
$166,302,715	**$169,261,964**	**$170,704,734**	**$169,688,068**	**$169,717,457**	**$166,729,453**	**$174,093,985**	**$172,336,271**	**$173,766,017**	**$175,284,442**

DTE Electric Company

WP KLB-9 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Tiered Costs: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**198,153**	**193,810**	**177,489**	**184,815**	**211,794**	**236,714**	**239,922**	**236,809**	**255,666**	**250,607**	**230,572**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	19,815	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	29,315	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,477	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	1,982	1,938	1,775	1,848	2,118	2,367	2,399	2,368	2,557	2,506	2,306
HVAC Equipment	17,476	14,861	17,393	33,965	29,980	42,865	50,266	40,753	18,545	38,287	30,879	42,596
Miscellaneous	560	495	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	35,668	29,071	26,623	27,722	31,769	35,507	35,988	35,521	38,350	37,591	34,586
Commerical & Industrial	**387,974**	**500,380**	**558,765**	**574,402**	**564,090**	**534,553**	**507,014**	**501,959**	**503,505**	**483,202**	**487,389**	**506,733**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	108,853	117,561	117,561	124,250	98,892	89,325	78,192	31,228	49,809	60,549	81,044
HVAC	31,038	40,030	44,701	45,952	45,127	42,764	40,561	40,157	40,280	38,656	38,991	40,539
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,268	1,255	1,259	1,208	2,941	2,937
Ventilation	7,759	10,008	44,218	49,369	11,282	10,691	10,140	10,039	10,070	9,664	9,748	10,135
Cooking	1,940	2,502	2,794	2,872	2,820	2,673	2,535	2,510	2,518	2,416	2,437	2,534
Pools	970	1,251	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,218	1,267
Other	970	1,251	1,397	1,436	1,410	1,336	1,268	1,255	1,259	1,208	1,218	1,267
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**698,534**	**752,574**	**751,891**	**748,905**	**746,346**	**743,728**	**741,882**	**740,314**	**738,868**	**737,996**	**737,305**
Pilots	35,143	37,964	40,901	40,864	40,701	40,562	40,420	40,318	40,231	40,149	40,095	40,055
Education	21,086	22,778	24,540	24,518	24,421	24,337	24,252	24,191	24,139	24,089	24,057	24,033
Total Savings	**702,851**	**759,276**	**818,016**	**817,273**	**814,027**	**811,246**	**808,399**	**806,390**	**804,684**	**803,107**	**802,147**	**801,392**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$31,228,561**	**$38,862,458**	**$41,829,639**	**$42,783,450**	**$50,010,751**	**$55,895,408**	**$55,540,272**	**$52,587,511**	**$60,112,302**	**$62,022,825**	**$57,968,174**
Lighting	15,192,489	12,572,169	9,688,552	5,436,201	5,399,258	5,369,861	5,351,551	5,359,764	5,353,783	2,854,384	2,606,114	2,483,147
Appliances	7,176,137	4,638,938	9,053,973	9,260,575	9,547,419	9,871,965	10,251,922	10,727,132	11,187,620	11,569,671	9,020,619	9,085,311
Electronics	3,741,531	4,226,252	6,216,690	7,066,971	8,145,260	9,203,374	10,681,155	11,982,264	15,373,745	16,772,139	23,958,930	15,922,485
Water Heating	1,979,097	689,980	3,964,627	4,656,708	5,377,651	6,111,876	6,888,133	7,763,259	8,627,863	9,335,321	9,263,486	9,264,582
HVAC Shell	1,153,480	764,727	806,093	741,073	775,940	895,146	1,008,013	1,030,409	1,026,312	1,118,317	1,114,759	1,040,699
HVAC Equipment	5,124,891	4,729,269	5,960,986	11,655,875	10,320,740	14,815,473	17,460,769	14,252,544	6,527,236	13,531,395	11,095,738	15,471,970
Miscellaneous	161,295	154,499	260,873	289,334	320,063	351,931	386,216	425,460	464,355	496,339	529,970	540,992
Cross-Cutting	5,071,274	3,452,728	2,910,664	2,722,902	2,897,118	3,391,125	3,867,648	3,999,440	4,026,597	4,434,736	4,433,209	4,158,989
Commerical & Industrial	**$58,998,406**	**$80,258,519**	**$95,785,728**	**$98,044,738**	**$90,937,143**	**$78,146,804**	**$73,546,365**	**$73,169,327**	**$73,165,614**	**$70,890,333**	**$67,380,815**	**$71,365,578**
Lighting	30,093,471	32,938,027	35,840,511	35,962,059	32,792,235	25,506,195	23,726,720	24,593,871	25,502,067	24,592,234	20,706,183	21,432,243
Office Equipment	8,632,730	9,220,063	9,805,647	9,912,798	14,201,540	14,463,952	13,519,211	13,654,139	18,788,329	15,389,424	14,653,965	14,358,654
Refrigeration	2,290,235	14,359,218	16,705,523	16,811,461	14,765,070	11,377,608	10,168,997	9,951,189	3,500,872	5,878,679	7,066,945	9,322,367
HVAC	9,320,249	13,194,847	16,045,034	16,535,592	16,624,705	14,800,459	14,264,519	12,824,851	12,895,885	12,553,848	12,069,418	12,927,924
Compressed Air	2,139,099	2,755,301	3,298,144	3,687,530	3,708,423	3,239,897	3,204,602	3,383,175	3,566,859	3,598,257	3,431,491	3,480,593
Water Heating	376,110	406,059	435,954	439,238	173,040	170,813	166,788	167,629	169,218	167,144	227,054	229,389
Ventilation	1,055,856	1,479,257	7,054,414	7,920,801	1,822,340	1,743,779	1,665,720	1,651,734	1,665,404	1,608,425	1,725,193	1,803,673
Cooking	529,885	749,526	910,773	938,849	924,472	878,394	835,285	829,073	833,772	802,252	811,374	945,101
Pools	179,302	252,475	305,615	315,462	311,603	298,952	249,232	250,162	251,103	207,576	461,555	481,022
Other	421,161	597,829	728,586	750,269	726,533	603,079	561,184	556,648	559,435	530,387	451,947	471,033
Machine Drive	2,915,557	3,182,052	3,452,721	3,557,452	3,663,806	3,830,216	3,940,873	4,053,875	4,169,835	4,289,217	4,473,563	4,600,886
Process Cooling & Heating	1,000,425	1,076,120	1,151,652	1,161,648	1,171,388	1,181,059	1,190,439	1,199,788	1,209,242	1,218,890	1,229,651	1,239,718
Agriculture	44,326	47,744	51,155	51,577	51,989	52,401	52,797	53,193	53,592	54,000	72,475	72,975
Overall Program (Res + C&I)	**$98,598,600**	**$111,487,080**	**$134,648,186**	**$139,874,377**	**$133,720,593**	**$128,157,555**	**$129,441,773**	**$128,709,599**	**$125,753,125**	**$131,002,636**	**$129,403,640**	**$129,333,752**
Pilots	5,666,586	6,407,303	7,738,401	8,038,757	7,685,092	7,365,377	7,439,182	7,397,103	7,227,191	7,528,887	7,436,991	7,432,974
Education	3,399,952	3,844,382	4,643,041	4,823,254	4,611,055	4,419,226	4,463,509	4,438,262	4,336,315	4,517,332	4,462,194	4,459,785
EM&V	5,666,586	6,407,303	7,738,401	8,038,757	7,685,092	7,365,377	7,439,182	7,397,103	7,227,191	7,528,887	7,436,991	7,432,974
Performance Incentive	22,666,345	25,629,214	30,953,606	32,155,029	30,740,366	29,461,507	29,756,729	29,588,414	28,908,764	30,115,548	29,747,963	29,731,897
Total Spend	**$135,998,068**	**$153,775,283**	**$185,721,636**	**$192,930,175**	**$184,442,197**	**$176,769,042**	**$178,540,377**	**$177,530,482**	**$173,452,586**	**$180,693,290**	**$178,487,780**	**$178,391,382**

DTE Electric Company

WP KLB-9 EWR Model 1.75% Defined PCA_1.75% Flexible PCA_Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
187,063	**190,672**	**190,744**	**172,406**	**166,851**	**176,868**	**195,103**	**186,257**	**186,178**	**186,177**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
20,320	22,456	21,312	17,241	16,685	17,687	19,510	18,626	18,618	18,618
88,809	88,894	89,506	87,907	89,315	96,000	108,489	99,840	99,840	99,840
27,789	28,572	28,420	7,181	2,086	2,211	2,439	5,337	5,285	5,284
1,871	1,907	1,907	1,724	1,669	1,769	1,951	1,863	1,862	1,862
14,030	14,300	14,306	12,930	12,514	13,265	14,633	13,969	13,963	13,963
468	477	1,475	431	417	442	488	466	465	465
28,059	28,601	28,612	25,861	25,028	26,530	29,265	27,939	27,927	27,927
549,571	**545,564**	**544,902**	**563,387**	**568,801**	**558,616**	**540,414**	**548,796**	**548,563**	**548,561**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
154,645	146,241	140,767	106,040	113,543	131,178	109,117	116,217	116,027	116,025
26,654	26,460	26,428	27,324	27,587	27,093	26,210	26,617	26,605	26,605
43,966	43,645	43,592	45,071	45,504	44,689	43,233	43,904	43,885	43,885
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,408	1,422	1,397	1,351	1,372	1,371	1,371
10,991	10,911	10,898	11,268	11,376	11,172	10,808	10,976	10,971	10,971
2,748	2,728	2,725	2,817	2,844	2,793	2,702	2,744	2,743	2,743
1,374	1,364	1,362	1,408	1,422	1,321	1,134	1,050	1,050	1,050
1,374	1,364	1,362	1,408	1,422	1,397	1,351	1,372	1,371	1,371
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	14,085	14,220	13,965	13,510	13,720	13,714	13,714
551	551	551	845	853	838	811	823	823	823
736,634	**736,236**	**735,646**	**735,793**	**735,652**	**735,483**	**735,516**	**735,053**	**734,741**	**734,738**
40,016	39,999	39,973	39,979	39,972	39,956	39,962	39,950	39,933	39,933
24,010	23,999	23,984	23,988	23,983	23,973	23,977	23,970	23,960	23,960
800,659	**800,234**	**799,603**	**799,760**	**799,607**	**799,413**	**799,455**	**798,973**	**798,634**	**798,631**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$43,282,208	**$44,902,958**	**$45,606,253**	**$37,986,165**	**$37,333,089**	**$40,282,180**	**$47,205,322**	**$43,051,756**	**$43,506,631**	**$43,997,895**
2,513,629	2,441,002	2,367,804	4,571,450	4,522,744	4,444,998	4,294,785	4,227,462	4,274,585	4,322,680
7,101,116	7,949,941	7,742,629	6,398,853	6,319,830	6,808,682	7,609,976	7,371,452	7,416,478	7,465,600
14,746,587	14,705,910	15,062,942	15,269,002	16,755,044	18,616,459	23,718,465	19,190,107	19,448,345	19,711,913
9,297,278	9,874,170	9,998,369	2,557,230	746,994	796,070	883,513	1,952,809	1,947,307	1,961,094
857,587	860,436	856,337	767,919	734,797	766,108	852,713	808,997	813,469	818,381
5,159,712	5,327,027	5,402,339	4,910,037	4,792,853	5,114,610	5,650,410	5,422,576	5,456,390	5,493,232
166,859	171,148	532,942	156,746	152,690	162,933	180,943	173,920	175,050	176,278
3,439,441	3,573,325	3,642,891	3,354,928	3,308,136	3,572,319	4,014,516	3,904,433	3,975,008	4,048,718
$93,316,223	**$94,053,437**	**$94,419,067**	**$101,196,604**	**$101,749,470**	**$95,809,372**	**$94,870,501**	**$97,390,684**	**$97,968,063**	**$98,577,605**
47,004,838	47,317,635	48,370,289	50,795,793	49,318,879	41,818,323	44,116,680	44,294,761	44,476,477	44,661,944
15,059,018	13,893,895	13,373,685	9,760,699	11,514,533	13,005,573	10,516,524	11,666,103	11,774,645	11,903,461
3,166,541	3,378,005	3,924,058	4,201,460	3,758,099	3,737,985	3,784,121	3,788,326	3,815,695	3,845,257
14,551,822	14,640,658	13,588,750	16,845,321	17,252,658	17,289,446	16,758,285	17,861,072	17,901,286	17,950,006
3,530,717	4,682,262	4,870,792	5,537,605	5,565,595	5,471,661	5,185,652	5,002,127	5,069,859	5,138,989
232,107	234,883	217,276	235,349	255,364	252,223	245,417	251,884	258,493	260,017
1,968,294	1,964,838	1,981,754	1,944,916	1,977,440	1,954,694	1,902,982	1,947,342	1,958,464	1,970,653
919,926	915,798	917,313	951,203	963,201	948,815	920,724	937,935	940,524	943,569
315,392	314,382	300,217	267,664	268,035	295,689	274,866	243,428	244,571	245,738
512,125	509,681	510,375	600,966	608,169	598,710	580,614	575,718	580,989	582,512
4,731,963	4,866,911	5,018,836	8,328,087	8,508,215	8,693,305	8,883,504	9,078,947	9,188,924	9,301,171
1,249,993	1,260,484	1,271,187	1,623,933	1,653,820	1,638,516	1,599,256	1,638,706	1,652,948	1,668,187
73,485	74,006	74,537	103,609	105,461	104,432	101,876	104,335	105,187	106,102
$136,598,431	**$138,956,395**	**$140,025,321**	**$139,182,769**	**$139,082,559**	**$136,091,552**	**$142,075,823**	**$140,442,440**	**$141,474,694**	**$142,575,501**
7,850,485	7,986,000	8,047,432	7,999,010	7,993,250	7,821,354	8,165,277	8,071,405	8,130,730	8,193,994
4,710,291	4,791,600	4,828,459	4,799,406	4,795,950	4,692,812	4,899,166	4,842,843	4,878,438	4,916,397
7,850,485	7,986,000	8,047,432	7,999,010	7,993,250	7,821,354	8,165,277	8,071,405	8,130,730	8,193,994
31,401,938	31,943,999	32,189,729	31,996,039	31,973,002	31,285,414	32,661,109	32,285,618	32,522,918	32,775,977
$188,411,629	**$191,663,993**	**$193,138,374**	**$191,976,233**	**$191,838,012**	**$187,712,486**	**$195,966,652**	**$193,713,710**	**$195,137,509**	**$196,655,863**

DTE Electric Company

WP KLB-10 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Flat Costs High: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**198,153**	**193,810**	**177,489**	**184,815**	**211,794**	**253,622**	**274,197**	**269,961**	**290,766**	**284,344**	**261,052**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	19,815	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	29,315	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,477	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	1,982	1,938	1,775	1,848	2,118	14,864	14,176	2,700	2,908	3,115	15,461
HVAC Equipment	17,476	14,861	17,393	33,965	29,980	42,865	52,141	58,109	46,392	67,771	58,947	55,348
Miscellaneous	560	495	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	35,668	29,071	26,623	27,722	31,769	38,043	41,130	40,494	43,615	42,652	39,158
Commerical & Industrial	**387,974**	**500,380**	**558,765**	**574,402**	**564,090**	**534,553**	**543,229**	**573,668**	**573,993**	**549,539**	**553,002**	**573,719**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	108,853	117,561	117,561	124,250	98,892	96,155	119,436	93,962	108,853	101,328	97,447
HVAC	31,038	40,030	44,701	45,952	45,127	42,764	43,458	45,893	45,919	43,963	44,240	45,898
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,587	1,595	1,435	1,370	2,941	2,937
Ventilation	7,759	10,008	44,218	49,369	11,282	10,691	36,036	33,889	11,480	10,991	28,728	54,791
Cooking	1,940	2,502	2,794	2,872	2,820	2,673	2,716	2,868	2,870	2,748	2,765	2,869
Pools	970	1,251	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,332	1,332
Other	970	1,251	1,397	1,436	1,410	1,336	1,358	1,434	1,435	1,374	1,383	1,434
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**698,534**	**752,574**	**751,891**	**748,905**	**746,346**	**796,851**	**847,865**	**843,954**	**840,306**	**837,347**	**834,771**
Pilots	35,143	37,964	40,901	40,864	40,701	40,562	43,307	46,077	45,863	45,661	45,492	45,347
Education	21,086	22,778	24,540	24,518	24,421	24,337	25,984	27,646	27,518	27,396	27,295	27,208
Total Savings	**702,851**	**759,276**	**818,016**	**817,273**	**814,027**	**811,246**	**866,142**	**921,589**	**917,335**	**913,363**	**910,134**	**907,325**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$35,331,396**	**$42,693,538**	**$46,372,210**	**$47,309,152**	**$55,292,990**	**$68,778,449**	**$74,324,310**	**$69,427,364**	**$78,596,413**	**$80,584,894**	**$76,342,733**
Lighting	15,192,489	13,879,077	10,548,303	6,134,824	6,078,882	6,030,399	5,993,008	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	5,489,374	10,087,983	10,304,597	10,612,124	10,961,944	11,374,329	11,894,044	12,396,191	12,806,373	10,118,963	10,190,306
Electronics	3,741,531	4,718,922	6,674,669	7,583,032	8,729,315	9,855,599	11,413,096	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	828,252	4,458,193	5,232,561	6,038,878	6,859,587	7,727,301	8,705,896	9,672,171	10,461,415	10,371,994	10,368,453
HVAC Shell	1,153,480	937,109	918,075	843,459	882,627	1,017,682	7,192,516	6,915,576	1,328,421	1,443,493	1,572,292	7,917,423
HVAC Equipment	5,124,891	5,730,018	6,741,273	13,169,490	11,651,451	16,712,865	20,417,733	22,895,750	18,384,824	26,947,761	23,827,053	22,605,171
Miscellaneous	161,295	186,945	294,781	326,703	361,148	396,832	435,205	479,114	522,574	558,201	595,627	607,608
Cross-Cutting	5,071,274	3,561,699	2,970,260	2,777,545	2,954,727	3,458,080	4,225,261	4,660,220	4,679,788	5,141,620	5,127,254	4,799,187
Commerical & Industrial	**$58,998,406**	**$98,281,437**	**$109,014,232**	**$111,477,704**	**$103,097,875**	**$88,171,709**	**$89,902,211**	**$95,102,865**	**$92,705,901**	**$89,925,886**	**$86,669,614**	**$93,220,269**
Lighting	30,093,471	41,089,903	41,278,213	41,399,761	37,726,412	29,325,757	27,252,671	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	10,642,638	10,754,030	10,861,181	15,684,802	15,798,594	14,753,327	14,888,256	20,597,098	16,851,715	15,927,971	15,611,940
Refrigeration	2,290,235	17,379,860	18,880,385	18,986,324	16,514,497	12,688,766	12,186,624	17,005,610	11,688,685	14,282,298	13,122,733	12,411,307
HVAC	9,320,249	16,603,374	18,582,521	19,144,114	19,247,517	17,111,048	17,667,855	16,906,522	16,951,493	16,460,701	15,765,632	16,854,367
Compressed Air	2,139,099	3,253,762	3,642,154	4,043,241	4,030,827	3,476,255	3,417,165	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	485,500	488,914	492,199	193,859	191,543	234,316	238,935	216,197	212,491	244,170	246,482
Ventilation	1,055,856	1,803,160	8,008,502	8,986,048	2,066,189	1,976,190	6,705,015	6,310,821	2,147,570	2,068,009	5,757,490	11,035,711
Cooking	529,885	940,741	1,053,123	1,085,183	1,068,179	1,014,576	1,033,340	1,093,659	1,096,725	1,052,392	1,061,486	1,236,022
Pools	179,302	312,580	350,360	361,459	356,874	342,294	285,274	286,204	287,145	237,294	583,023	584,230
Other	421,161	758,198	847,972	872,997	845,027	700,091	697,605	737,903	739,545	699,145	592,493	615,990
Machine Drive	2,915,557	3,683,523	3,789,025	3,895,746	4,004,090	4,176,911	4,289,557	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,271,543	1,281,934	1,291,930	1,301,670	1,311,341	1,320,721	1,330,070	1,339,524	1,349,171	1,360,026	1,370,092
Agriculture	44,326	56,658	57,097	57,520	57,932	58,344	58,740	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$133,612,833**	**$151,707,770**	**$157,849,914**	**$150,407,027**	**$143,464,699**	**$158,680,660**	**$169,427,175**	**$162,133,265**	**$168,522,300**	**$167,254,509**	**$169,563,002**
Pilots	5,666,586	7,678,898	8,718,837	9,071,834	8,644,082	8,245,098	9,119,578	9,737,194	9,318,004	9,685,190	9,612,328	9,745,000
Education	3,399,952	4,607,339	5,231,302	5,443,100	5,186,449	4,947,059	5,471,747	5,842,316	5,590,802	5,811,114	5,767,397	5,847,000
EM&V	5,666,586	7,678,898	8,718,837	9,071,834	8,644,082	8,245,098	9,119,578	9,737,194	9,318,004	9,685,190	9,612,328	9,745,000
Performance Incentive	22,666,345	30,715,594	34,875,349	36,287,336	34,576,328	32,980,390	36,478,313	38,948,776	37,272,015	38,740,759	38,449,312	38,980,000
Total Spend	**$135,998,068**	**$184,293,563**	**$209,252,096**	**$217,724,019**	**$207,457,968**	**$197,882,343**	**$218,869,876**	**$233,692,656**	**$223,632,090**	**$232,444,551**	**$230,695,874**	**$233,880,003**

DTE Electric Company

WP KLB-10 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
211,467	**215,312**	**215,164**	**194,256**	**187,874**	**198,947**	**219,346**	**209,189**	**209,008**	**208,963**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
26,349	25,911	25,428	19,426	18,787	19,895	21,935	20,919	20,901	20,896
88,809	88,894	89,506	87,907	95,500	97,134	124,247	99,840	99,840	99,840
27,789	28,572	28,420	21,657	9,829	15,705	2,742	20,529	20,410	20,380
2,115	2,153	2,152	1,943	1,879	1,989	2,193	2,092	2,090	2,090
27,432	30,523	30,703	14,569	14,091	14,921	16,451	15,689	15,676	15,672
1,535	1,497	1,475	486	470	497	548	523	523	522
31,720	32,297	32,275	29,138	28,181	29,842	32,902	31,378	31,351	31,345
621,266	**616,067**	**614,660**	**634,787**	**640,469**	**628,351**	**607,565**	**616,364**	**615,832**	**615,700**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
201,818	180,503	144,890	164,104	171,833	181,013	161,315	145,423	145,423	145,423
43,290	54,945	84,390	30,787	31,063	32,657	29,467	50,621	50,147	50,029
49,701	49,285	49,173	50,783	51,238	50,268	48,605	49,309	49,267	49,256
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,587	1,601	1,571	1,519	1,541	1,540	1,539
12,425	12,321	12,293	12,696	12,809	12,567	12,151	12,327	12,317	12,314
3,106	3,080	3,073	3,174	3,202	3,142	3,038	3,082	3,079	3,078
1,553	1,540	1,537	1,587	1,601	1,321	1,134	1,050	1,050	1,050
1,553	1,540	1,537	1,587	1,601	1,571	1,519	1,541	1,540	1,539
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	15,870	16,012	20,567	17,730	20,567	20,567	20,567
551	551	551	901	901	901	901	901	901	901
832,733	**831,379**	**829,824**	**829,043**	**828,343**	**827,298**	**826,911**	**825,553**	**824,840**	**824,663**
45,224	45,138	45,048	44,999	44,972	44,908	44,899	44,851	44,802	44,784
27,134	27,083	27,029	26,999	26,983	26,945	26,939	26,910	26,881	26,870
905,091	**903,600**	**901,900**	**901,041**	**900,298**	**899,150**	**898,749**	**897,315**	**896,524**	**896,317**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$56,224,252	**$58,239,712**	**$59,050,807**	**$49,093,430**	**$46,885,344**	**$51,527,844**	**$57,612,487**	**$55,096,178**	**$55,569,097**	**$56,103,781**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370
10,324,705	10,281,494	10,356,761	8,083,652	7,978,623	8,585,169	9,587,206	9,274,627	9,320,677	9,373,836
15,634,918	15,550,229	15,922,036	16,160,360	19,077,571	20,085,340	29,248,479	20,355,334	20,613,572	20,877,139
10,401,650	11,053,914	11,191,546	8,628,540	3,935,859	6,317,270	1,108,812	8,380,718	8,384,644	8,426,208
1,099,735	1,100,685	1,093,182	978,082	934,060	971,317	1,080,029	1,022,401	1,026,924	1,032,220
11,339,493	12,775,337	13,023,229	6,209,741	6,054,150	6,449,594	7,114,919	6,815,893	6,850,551	6,890,451
614,797	602,869	597,345	197,817	192,438	204,990	227,371	218,168	219,331	220,663
3,962,092	4,111,060	4,185,700	3,849,489	3,792,380	4,089,872	4,592,542	4,460,885	4,538,123	4,619,894
$115,267,851	**$116,438,545**	**$119,070,118**	**$123,844,176**	**$124,984,303**	**$117,791,613**	**$116,090,991**	**$120,370,157**	**$120,955,956**	**$121,615,616**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614
21,480,547	18,678,279	14,968,261	16,353,444	18,986,246	19,485,155	16,810,026	15,811,617	15,971,825	16,133,483
5,698,692	7,796,702	14,027,368	5,303,397	4,704,557	5,007,068	4,734,590	8,002,044	7,981,766	8,018,613
18,949,269	19,041,411	17,617,199	21,890,985	22,403,014	22,427,551	21,719,289	23,138,212	23,171,887	23,221,657
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112
249,200	251,976	234,152	298,264	324,168	319,644	310,659	318,383	326,682	328,323
2,516,751	2,508,104	2,525,902	2,468,459	2,506,611	2,473,669	2,405,445	2,457,570	2,468,862	2,482,020
1,198,210	1,191,093	1,191,337	1,233,470	1,247,728	1,227,339	1,189,916	1,210,438	1,212,746	1,215,908
406,833	404,884	385,406	341,099	340,953	335,985	312,959	276,553	277,697	278,863
668,478	664,339	664,304	782,914	791,530	778,163	754,011	746,271	752,615	754,164
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354
1,380,368	1,390,859	1,401,561	2,015,559	2,049,682	2,653,883	2,306,389	2,697,346	2,719,747	2,742,610
81,974	82,495	83,026	122,178	123,083	124,006	124,949	125,911	126,892	127,893
$171,492,103	**$174,678,257**	**$178,120,925**	**$172,937,606**	**$171,869,647**	**$169,319,457**	**$173,703,478**	**$175,466,335**	**$176,525,054**	**$177,719,397**
9,855,868	10,038,980	10,236,835	9,938,943	9,877,566	9,731,003	9,982,959	10,084,272	10,145,118	10,213,758
5,913,521	6,023,388	6,142,101	5,963,366	5,926,540	5,838,602	5,989,775	6,050,563	6,087,071	6,128,255
9,855,868	10,038,980	10,236,835	9,938,943	9,877,566	9,731,003	9,982,959	10,084,272	10,145,118	10,213,758
39,423,472	40,155,921	40,947,339	39,755,772	39,510,264	38,924,013	39,931,834	40,337,089	40,580,472	40,855,034
$236,540,831	**$240,935,527**	**$245,684,035**	**$238,534,629**	**$237,061,582**	**$233,544,078**	**$239,591,005**	**$242,022,531**	**$243,482,833**	**$245,130,203**

DTE Electric Company

WP KLB-11 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Flat Costs Low: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**198,153**	**193,810**	**177,489**	**184,815**	**211,794**	**253,622**	**274,197**	**269,961**	**290,766**	**284,344**	**261,052**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	19,815	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	29,315	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,477	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	1,982	1,938	1,775	1,848	2,118	14,864	14,176	2,700	2,908	3,115	15,461
HVAC Equipment	17,476	14,861	17,393	33,965	29,980	42,865	52,141	58,109	46,392	67,771	58,947	55,348
Miscellaneous	560	495	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	35,668	29,071	26,623	27,722	31,769	38,043	41,130	40,494	43,615	42,652	39,158
Commerical & Industrial	**387,974**	**500,380**	**558,765**	**574,402**	**564,090**	**534,553**	**543,229**	**573,668**	**573,993**	**549,539**	**553,002**	**573,719**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	108,853	117,561	117,561	124,250	98,892	96,155	119,436	93,962	108,853	101,328	97,447
HVAC	31,038	40,030	44,701	45,952	45,127	42,764	43,458	45,893	45,919	43,963	44,240	45,898
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,587	1,595	1,435	1,370	2,941	2,937
Ventilation	7,759	10,008	44,218	49,369	11,282	10,691	36,036	33,889	11,480	10,991	28,728	54,791
Cooking	1,940	2,502	2,794	2,872	2,820	2,673	2,716	2,868	2,870	2,748	2,765	2,869
Pools	970	1,251	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,332	1,332
Other	970	1,251	1,397	1,436	1,410	1,336	1,358	1,434	1,435	1,374	1,383	1,434
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**698,534**	**752,574**	**751,891**	**748,905**	**746,346**	**796,851**	**847,865**	**843,954**	**840,306**	**837,347**	**834,771**
Pilots	35,143	37,964	40,901	40,864	40,701	40,562	43,307	46,077	45,863	45,661	45,492	45,347
Education	21,086	22,778	24,540	24,518	24,421	24,337	25,984	27,646	27,518	27,396	27,295	27,208
Total Savings	**702,851**	**759,276**	**818,016**	**817,273**	**814,027**	**811,246**	**866,142**	**921,589**	**917,335**	**913,363**	**910,134**	**907,325**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$29,860,950**	**$35,031,378**	**$37,287,068**	**$38,257,748**	**$44,728,512**	**$55,510,732**	**$60,155,030**	**$56,765,514**	**$63,993,390**	**$65,367,469**	**$61,832,793**
Lighting	15,192,489	12,136,533	8,828,801	4,737,578	4,719,635	4,709,323	4,710,094	4,736,136	4,750,607	2,467,314	2,250,566	2,148,004
Appliances	7,176,137	4,355,459	8,019,962	8,216,553	8,482,714	8,781,986	9,129,516	9,560,221	9,979,049	10,332,968	7,922,275	7,980,316
Electronics	3,741,531	4,062,029	5,758,710	6,550,910	7,561,206	8,551,149	9,949,215	11,174,210	14,261,053	15,548,181	21,907,812	14,808,675
Water Heating	1,979,097	643,889	3,471,060	4,080,856	4,716,424	5,364,165	6,048,965	6,820,622	7,583,554	8,209,228	8,154,978	8,160,711
HVAC Shell	1,153,480	707,266	694,111	638,687	669,252	772,611	5,466,439	5,261,129	1,011,558	1,100,204	1,198,732	6,039,267
HVAC Equipment	5,124,891	4,395,686	5,180,699	10,142,261	8,990,028	12,918,081	15,806,721	17,749,552	14,272,752	20,955,499	18,536,009	17,603,081
Miscellaneous	161,295	143,684	226,966	251,965	278,979	307,029	337,227	371,805	406,135	434,476	464,312	474,376
Cross-Cutting	5,071,274	3,416,404	2,851,067	2,668,260	2,839,510	3,324,169	4,062,556	4,481,356	4,500,805	4,945,519	4,932,784	4,618,363
Commerical & Industrial	**$58,998,406**	**$74,250,879**	**$82,557,224**	**$84,611,771**	**$78,776,411**	**$68,121,899**	**$69,574,971**	**$73,732,736**	**$72,205,683**	**$70,091,573**	**$68,004,924**	**$73,021,289**
Lighting	30,093,471	30,220,735	30,402,809	30,524,357	27,858,058	21,686,632	20,200,769	20,946,474	21,732,060	20,981,008	17,687,868	18,319,364
Office Equipment	8,632,730	8,745,871	8,857,263	8,964,415	12,718,277	13,129,310	12,285,094	12,420,023	16,979,561	13,927,133	13,379,959	13,105,369
Refrigeration	2,290,235	13,352,337	14,530,660	14,636,598	13,015,643	10,066,450	9,706,568	13,394,770	9,378,971	11,412,588	10,530,136	10,007,174
HVAC	9,320,249	12,058,672	13,507,546	13,927,070	14,001,894	12,489,870	12,898,972	12,407,424	12,450,969	12,093,967	11,622,838	12,419,425
Compressed Air	2,139,099	2,589,147	2,954,135	3,331,819	3,386,019	3,003,539	2,992,038	3,166,419	3,345,910	3,391,118	3,248,480	3,297,582
Water Heating	376,110	379,579	382,993	386,278	152,221	150,084	183,434	187,163	169,617	166,548	209,939	212,296
Ventilation	1,055,856	1,371,289	6,100,326	6,855,554	1,578,490	1,511,367	5,134,218	4,840,589	1,649,530	1,590,475	4,411,355	8,466,770
Cooking	529,885	685,788	768,423	792,515	780,765	742,211	756,555	801,365	804,266	772,392	779,721	904,051
Pools	179,302	232,440	260,870	269,465	266,332	255,610	213,189	214,120	215,060	177,857	425,781	426,988
Other	421,161	544,373	609,199	627,542	608,039	506,068	504,932	534,434	535,960	507,260	433,086	450,611
Machine Drive	2,915,557	3,014,895	3,116,417	3,219,158	3,323,522	3,483,522	3,592,188	3,703,200	3,817,170	3,934,563	4,112,498	4,237,831
Process Cooling & Heating	1,000,425	1,010,980	1,021,371	1,031,366	1,041,106	1,050,777	1,060,157	1,069,506	1,078,960	1,088,608	1,099,277	1,109,343
Agriculture	44,326	44,773	45,212	45,635	46,046	46,458	46,854	47,250	47,649	48,057	63,986	64,486
Overall Program (Res + C&I)	**$98,598,600**	**$104,111,829**	**$117,588,602**	**$121,898,840**	**$117,034,159**	**$112,850,412**	**$125,085,703**	**$133,887,767**	**$128,971,197**	**$134,084,963**	**$133,372,393**	**$134,854,082**
Pilots	5,666,586	5,983,438	6,757,966	7,005,680	6,726,101	6,485,656	7,188,833	7,694,699	7,412,138	7,706,032	7,665,080	7,750,235
Education	3,399,952	3,590,063	4,054,779	4,203,408	4,035,661	3,891,394	4,313,300	4,616,820	4,447,283	4,623,619	4,599,048	4,650,141
EM&V	5,666,586	5,983,438	6,757,966	7,005,680	6,726,101	6,485,656	7,188,833	7,694,699	7,412,138	7,706,032	7,665,080	7,750,235
Performance Incentive	22,666,345	23,933,754	27,031,863	28,022,722	26,904,404	25,942,623	28,755,334	30,778,797	29,648,551	30,824,129	30,660,320	31,000,938
Total Spend	**$135,998,068**	**$143,602,522**	**$162,191,175**	**$168,136,331**	**$161,426,426**	**$155,655,740**	**$172,532,004**	**$184,672,781**	**$177,891,307**	**$184,944,777**	**$183,961,921**	**$186,005,630**

DTE Electric Company

WP KLB-11 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
211,467	**215,312**	**215,164**	**194,256**	**187,874**	**198,947**	**219,346**	**209,189**	**209,008**	**208,963**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
26,349	25,911	25,428	19,426	18,787	19,895	21,935	20,919	20,901	20,896
88,809	88,894	89,506	87,907	95,500	97,134	124,247	99,840	99,840	99,840
27,789	28,572	28,420	21,657	9,829	15,705	2,742	20,529	20,410	20,380
2,115	2,153	2,152	1,943	1,879	1,989	2,193	2,092	2,090	2,090
27,432	30,523	30,703	14,569	14,091	14,921	16,451	15,689	15,676	15,672
1,535	1,497	1,475	486	470	497	548	523	523	522
31,720	32,297	32,275	29,138	28,181	29,842	32,902	31,378	31,351	31,345
621,266	**616,067**	**614,660**	**634,787**	**640,469**	**628,351**	**607,565**	**616,364**	**615,832**	**615,700**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
201,818	180,503	144,890	164,104	171,833	181,013	161,315	145,423	145,423	145,423
43,290	54,945	84,390	30,787	31,063	32,657	29,467	50,621	50,147	50,029
49,701	49,285	49,173	50,783	51,238	50,268	48,605	49,309	49,267	49,256
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,587	1,601	1,571	1,519	1,541	1,540	1,539
12,425	12,321	12,293	12,696	12,809	12,567	12,151	12,327	12,317	12,314
3,106	3,080	3,073	3,174	3,202	3,142	3,038	3,082	3,079	3,078
1,553	1,540	1,537	1,587	1,601	1,321	1,134	1,050	1,050	1,050
1,553	1,540	1,537	1,587	1,601	1,571	1,519	1,541	1,540	1,539
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	15,870	16,012	20,567	17,730	20,567	20,567	20,567
551	551	551	901	901	901	901	901	901	901
832,733	**831,379**	**829,824**	**829,043**	**828,343**	**827,298**	**826,911**	**825,553**	**824,840**	**824,663**
45,224	45,138	45,048	44,999	44,972	44,908	44,899	44,851	44,802	44,784
27,134	27,083	27,029	26,999	26,983	26,945	26,939	26,910	26,881	26,870
905,091	**903,600**	**901,900**	**901,041**	**900,298**	**899,150**	**898,749**	**897,315**	**896,524**	**896,317**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$46,295,146	**$47,977,112**	**$48,687,701**	**$41,139,300**	**$39,505,502**	**$43,294,555**	**$48,458,071**	**$46,479,294**	**$46,965,685**	**$47,503,721**
2,180,395	2,117,880	2,054,599	4,157,152	4,125,225	4,065,705	3,936,440	3,886,772	3,933,895	3,981,991
8,091,800	8,064,635	8,118,595	6,335,946	6,253,612	6,732,125	7,523,977	7,283,436	7,331,206	7,384,793
13,858,255	13,861,591	14,203,847	14,377,644	16,752,796	17,587,303	25,078,751	18,024,881	18,283,119	18,546,686
8,192,907	8,694,426	8,805,192	6,795,167	3,104,881	4,992,427	877,785	6,642,969	6,657,027	6,701,112
839,196	842,572	838,749	752,396	720,700	752,173	837,313	794,801	799,520	804,865
8,837,675	9,964,735	10,165,369	4,854,861	4,739,337	5,056,596	5,590,143	5,364,523	5,400,435	5,440,646
480,728	472,134	468,540	155,406	151,421	161,556	179,483	172,497	173,700	175,042
3,814,190	3,959,139	4,032,810	3,710,727	3,657,530	3,946,670	4,434,179	4,309,415	4,386,784	4,468,587
$89,270,833	**$90,193,158**	**$92,193,214**	**$96,012,031**	**$97,086,518**	**$92,063,214**	**$90,745,544**	**$94,075,646**	**$94,678,449**	**$95,343,388**
40,182,883	40,476,734	41,404,824	43,487,143	42,265,898	35,879,957	37,863,010	38,041,091	38,222,807	38,408,274
17,824,671	15,619,786	12,562,552	13,857,087	15,865,309	16,407,752	14,284,544	13,384,218	13,543,880	13,705,538
4,587,179	6,232,381	11,033,410	4,164,452	3,758,669	4,004,362	3,774,083	6,407,646	6,402,291	6,442,852
13,951,155	14,023,882	13,039,570	16,069,378	16,449,910	16,468,013	15,962,051	16,982,072	17,021,063	17,072,157
3,347,707	4,328,602	4,495,090	5,121,553	5,154,743	5,086,369	4,856,593	4,702,004	4,769,736	4,838,866
215,014	217,790	200,400	232,087	250,911	247,774	241,166	247,409	253,701	255,357
1,933,392	1,929,396	1,945,014	1,914,343	1,946,578	1,923,750	1,873,448	1,916,630	1,928,389	1,941,663
881,664	877,196	878,157	910,034	921,397	907,183	880,350	896,389	898,969	902,198
306,241	305,134	291,895	262,072	262,661	255,392	236,772	210,302	211,446	212,612
489,393	486,753	487,123	571,342	578,065	568,737	551,512	546,931	551,854	553,446
4,366,918	4,499,876	4,648,318	7,679,865	7,858,002	8,041,103	8,229,312	8,422,764	8,532,742	8,644,989
1,119,619	1,130,110	1,140,812	1,643,919	1,674,715	2,172,240	1,891,177	2,215,703	2,238,104	2,260,967
64,996	65,517	66,048	98,755	99,660	100,583	101,526	102,487	103,469	104,470
$135,565,979	**$138,170,270**	**$140,880,915**	**$137,151,332**	**$136,592,020**	**$135,357,770**	**$139,203,615**	**$140,554,940**	**$141,644,134**	**$142,847,110**
7,791,148	7,940,820	8,096,604	7,882,260	7,850,116	7,779,182	8,000,208	8,077,870	8,140,467	8,209,604
4,674,689	4,764,492	4,857,963	4,729,356	4,710,070	4,667,509	4,800,125	4,846,722	4,884,280	4,925,762
7,791,148	7,940,820	8,096,604	7,882,260	7,850,116	7,779,182	8,000,208	8,077,870	8,140,467	8,209,604
31,164,593	31,763,280	32,386,417	31,529,042	31,400,464	31,116,729	32,000,831	32,311,480	32,561,870	32,838,416
$186,987,557	**$190,579,683**	**$194,318,504**	**$189,174,251**	**$188,402,786**	**$186,700,372**	**$192,004,986**	**$193,868,883**	**$195,371,220**	**$197,030,496**

DTE Electric Company

WP KLB-12 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Tiered Costs: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**198,153**	**193,810**	**177,489**	**184,815**	**211,794**	**253,622**	**274,197**	**269,961**	**290,766**	**284,344**	**261,052**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	19,815	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	29,315	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,477	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	1,982	1,938	1,775	1,848	2,118	14,864	14,176	2,700	2,908	3,115	15,461
HVAC Equipment	17,476	14,861	17,393	33,965	29,980	42,865	52,141	58,109	46,392	67,771	58,947	55,348
Miscellaneous	560	495	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	35,668	29,071	26,623	27,722	31,769	38,043	41,130	40,494	43,615	42,652	39,158
Commerical & Industrial	**387,974**	**500,380**	**558,765**	**574,402**	**564,090**	**534,553**	**543,229**	**573,668**	**573,993**	**549,539**	**553,002**	**573,719**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	108,853	117,561	117,561	124,250	98,892	96,155	119,436	93,962	108,853	101,328	97,447
HVAC	31,038	40,030	44,701	45,952	45,127	42,764	43,458	45,893	45,919	43,963	44,240	45,898
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	1,410	1,336	1,587	1,595	1,435	1,370	2,941	2,937
Ventilation	7,759	10,008	44,218	49,369	11,282	10,691	36,036	33,889	11,480	10,991	28,728	54,791
Cooking	1,940	2,502	2,794	2,872	2,820	2,673	2,716	2,868	2,870	2,748	2,765	2,869
Pools	970	1,251	1,397	1,436	1,410	1,336	1,104	1,104	1,104	904	1,332	1,332
Other	970	1,251	1,397	1,436	1,410	1,336	1,358	1,434	1,435	1,374	1,383	1,434
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**698,534**	**752,574**	**751,891**	**748,905**	**746,346**	**796,851**	**847,865**	**843,954**	**840,306**	**837,347**	**834,771**
Pilots	35,143	37,964	40,901	40,864	40,701	40,562	43,307	46,077	45,863	45,661	45,492	45,347
Education	21,086	22,778	24,540	24,518	24,421	24,337	25,984	27,646	27,518	27,396	27,295	27,208
Total Savings	**702,851**	**759,276**	**818,016**	**817,273**	**814,027**	**811,246**	**866,142**	**921,589**	**917,335**	**913,363**	**910,134**	**907,325**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$31,228,561**	**$38,862,458**	**$41,829,639**	**$42,783,450**	**$50,010,751**	**$65,461,520**	**$74,324,310**	**$69,427,364**	**$78,596,413**	**$80,584,894**	**$76,342,733**
Lighting	15,192,489	12,572,169	9,688,552	5,436,201	5,399,258	5,369,861	5,672,279	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	4,638,938	9,053,973	9,260,575	9,547,419	9,871,965	10,813,126	11,894,044	12,396,191	12,806,373	10,118,963	10,190,306
Electronics	3,741,531	4,226,252	6,216,690	7,066,971	8,145,260	9,203,374	11,047,126	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	689,980	3,964,627	4,656,708	5,377,651	6,111,876	7,307,717	8,705,896	9,672,171	10,461,415	10,371,994	10,368,453
HVAC Shell	1,153,480	764,727	806,093	741,073	775,940	895,146	6,760,996	6,915,576	1,328,421	1,443,493	1,572,292	7,917,423
HVAC Equipment	5,124,891	4,729,269	5,960,986	11,655,875	10,320,740	14,815,473	19,264,980	22,895,750	18,384,824	26,947,761	23,827,053	22,605,171
Miscellaneous	161,295	154,499	260,873	289,334	320,063	351,931	410,711	479,114	522,574	558,201	595,627	607,608
Cross-Cutting	5,071,274	3,452,728	2,910,664	2,722,902	2,897,118	3,391,125	4,184,585	4,660,220	4,679,788	5,141,620	5,127,254	4,799,187
Commerical & Industrial	**$58,998,406**	**$80,258,519**	**$95,785,728**	**$98,044,738**	**$90,937,143**	**$78,146,804**	**$84,820,401**	**$95,102,865**	**$92,705,901**	**$89,925,886**	**$86,669,614**	**$93,220,269**
Lighting	30,093,471	32,938,027	35,840,511	35,962,059	32,792,235	25,506,195	25,489,695	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	9,220,063	9,805,647	9,912,798	14,201,540	14,463,952	14,136,269	14,888,256	20,597,098	16,851,715	15,927,971	15,611,940
Refrigeration	2,290,235	14,359,218	16,705,523	16,811,461	14,765,070	11,377,608	11,566,610	17,005,610	11,688,685	14,282,298	13,122,733	12,411,307
HVAC	9,320,249	13,194,847	16,045,034	16,535,592	16,624,705	14,800,459	16,475,634	16,906,522	16,951,493	16,460,701	15,765,632	16,854,367
Compressed Air	2,139,099	2,755,301	3,298,144	3,687,530	3,708,423	3,239,897	3,310,883	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	406,059	435,954	439,238	173,040	170,813	221,595	238,935	216,197	212,491	244,170	246,482
Ventilation	1,055,856	1,479,257	7,054,414	7,920,801	1,822,340	1,743,779	6,312,316	6,310,821	2,147,570	2,068,009	5,757,490	11,035,711
Cooking	529,885	749,526	910,773	938,849	924,472	878,394	964,144	1,093,659	1,096,725	1,052,392	1,061,486	1,236,022
Pools	179,302	252,475	305,615	315,462	311,603	298,952	267,253	286,204	287,145	237,294	583,023	584,230
Other	421,161	597,829	728,586	750,269	726,533	603,079	649,437	737,903	739,545	699,145	592,493	615,990
Machine Drive	2,915,557	3,182,052	3,452,721	3,557,452	3,663,806	3,830,216	4,115,215	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,076,120	1,151,652	1,161,648	1,171,388	1,181,059	1,255,580	1,330,070	1,339,524	1,349,171	1,360,026	1,370,092
Agriculture	44,326	47,744	51,155	51,577	51,989	52,401	55,769	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$111,487,080**	**$134,648,186**	**$139,874,377**	**$133,720,593**	**$128,157,555**	**$150,281,921**	**$169,427,175**	**$162,133,265**	**$168,522,300**	**$167,254,509**	**$169,563,002**
Pilots	5,666,586	6,407,303	7,738,401	8,038,757	7,685,092	7,365,377	8,636,892	9,737,194	9,318,004	9,685,190	9,612,328	9,745,000
Education	3,399,952	3,844,382	4,643,041	4,823,254	4,611,055	4,419,226	5,182,135	5,842,316	5,590,802	5,811,114	5,767,397	5,847,000
EM&V	5,666,586	6,407,303	7,738,401	8,038,757	7,685,092	7,365,377	8,636,892	9,737,194	9,318,004	9,685,190	9,612,328	9,745,000
Performance Incentive	22,666,345	25,629,214	30,953,606	32,155,029	30,740,366	29,461,507	34,547,568	38,948,776	37,272,015	38,740,759	38,449,312	38,980,000
Total Spend	**$135,998,068**	**$153,775,283**	**$185,721,636**	**$192,930,175**	**$184,442,197**	**$176,769,042**	**$207,285,408**	**$233,692,656**	**$223,632,090**	**$232,444,551**	**$230,695,874**	**$233,880,003**

DTE Electric Company

WP KLB-12 EWR Model 1.75% Defined PCA_2.00% Flexible PCA_Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
211,467	**215,312**	**215,164**	**194,256**	**187,874**	**198,947**	**219,346**	**209,189**	**209,008**	**208,963**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
26,349	25,911	25,428	19,426	18,787	19,895	21,935	20,919	20,901	20,896
88,809	88,894	89,506	87,907	95,500	97,134	124,247	99,840	99,840	99,840
27,789	28,572	28,420	21,657	9,829	15,705	2,742	20,529	20,410	20,380
2,115	2,153	2,152	1,943	1,879	1,989	2,193	2,092	2,090	2,090
27,432	30,523	30,703	14,569	14,091	14,921	16,451	15,689	15,676	15,672
1,535	1,497	1,475	486	470	497	548	523	523	522
31,720	32,297	32,275	29,138	28,181	29,842	32,902	31,378	31,351	31,345
621,266	**616,067**	**614,660**	**634,787**	**640,469**	**628,351**	**607,565**	**616,364**	**615,832**	**615,700**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
201,818	180,503	144,890	164,104	171,833	181,013	161,315	145,423	145,423	145,423
43,290	54,945	84,390	30,787	31,063	32,657	29,467	50,621	50,147	50,029
49,701	49,285	49,173	50,783	51,238	50,268	48,605	49,309	49,267	49,256
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,587	1,601	1,571	1,519	1,541	1,540	1,539
12,425	12,321	12,293	12,696	12,809	12,567	12,151	12,327	12,317	12,314
3,106	3,080	3,073	3,174	3,202	3,142	3,038	3,082	3,079	3,078
1,553	1,540	1,537	1,587	1,601	1,321	1,134	1,050	1,050	1,050
1,553	1,540	1,537	1,587	1,601	1,571	1,519	1,541	1,540	1,539
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	15,870	16,012	20,567	17,730	20,567	20,567	20,567
551	551	551	901	901	901	901	901	901	901
832,733	**831,379**	**829,824**	**829,043**	**828,343**	**827,298**	**826,911**	**825,553**	**824,840**	**824,663**
45,224	45,138	45,048	44,999	44,972	44,908	44,899	44,851	44,802	44,784
27,134	27,083	27,029	26,999	26,983	26,945	26,939	26,910	26,881	26,870
905,091	**903,600**	**901,900**	**901,041**	**900,298**	**899,150**	**898,749**	**897,315**	**896,524**	**896,317**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$56,224,252	**$58,239,712**	**$59,050,807**	**$49,093,430**	**$46,885,344**	**$51,527,844**	**$57,612,487**	**$55,096,178**	**$55,569,097**	**$56,103,781**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370
10,324,705	10,281,494	10,356,761	8,083,652	7,978,623	8,585,169	9,587,206	9,274,627	9,320,677	9,373,836
15,634,918	15,550,229	15,922,036	16,160,360	19,077,571	20,085,340	29,248,479	20,355,334	20,613,572	20,877,139
10,401,650	11,053,914	11,191,546	8,628,540	3,935,859	6,317,270	1,108,812	8,380,718	8,384,644	8,426,208
1,099,735	1,100,685	1,093,182	978,082	934,060	971,317	1,080,029	1,022,401	1,026,924	1,032,220
11,339,493	12,775,337	13,023,229	6,209,741	6,054,150	6,449,594	7,114,919	6,815,893	6,850,551	6,890,451
614,797	602,869	597,345	197,817	192,438	204,990	227,371	218,168	219,331	220,663
3,962,092	4,111,060	4,185,700	3,849,489	3,792,380	4,089,872	4,592,542	4,460,885	4,538,123	4,619,894
$115,267,851	**$116,438,545**	**$119,070,118**	**$123,844,176**	**$124,984,303**	**$117,791,613**	**$116,090,991**	**$120,370,157**	**$120,955,956**	**$121,615,616**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614
21,480,547	18,678,279	14,968,261	16,353,444	18,986,246	19,485,155	16,810,026	15,811,617	15,971,825	16,133,483
5,698,692	7,796,702	14,027,368	5,303,397	4,704,557	5,007,068	4,734,590	8,002,044	7,981,766	8,018,613
18,949,269	19,041,411	17,617,199	21,890,985	22,403,014	22,427,551	21,719,289	23,138,212	23,171,887	23,221,657
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112
249,200	251,976	234,152	298,264	324,168	319,644	310,659	318,383	326,682	328,323
2,516,751	2,508,104	2,525,902	2,468,459	2,506,611	2,473,669	2,405,445	2,457,570	2,468,862	2,482,020
1,198,210	1,191,093	1,191,337	1,233,470	1,247,728	1,227,339	1,189,916	1,210,438	1,212,746	1,215,908
406,833	404,884	385,406	341,099	340,953	335,985	312,959	276,553	277,697	278,863
668,478	664,339	664,304	782,914	791,530	778,163	754,011	746,271	752,615	754,164
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354
1,380,368	1,390,859	1,401,561	2,015,559	2,049,682	2,653,883	2,306,389	2,697,346	2,719,747	2,742,610
81,974	82,495	83,026	122,178	123,083	124,006	124,949	125,911	126,892	127,893
$171,492,103	**$174,678,257**	**$178,120,925**	**$172,937,606**	**$171,869,647**	**$169,319,457**	**$173,703,478**	**$175,466,335**	**$176,525,054**	**$177,719,397**
9,855,868	10,038,980	10,236,835	9,938,943	9,877,566	9,731,003	9,982,959	10,084,272	10,145,118	10,213,758
5,913,521	6,023,388	6,142,101	5,963,366	5,926,540	5,838,602	5,989,775	6,050,563	6,087,071	6,128,255
9,855,868	10,038,980	10,236,835	9,938,943	9,877,566	9,731,003	9,982,959	10,084,272	10,145,118	10,213,758
39,423,472	40,155,921	40,947,339	39,755,772	39,510,264	38,924,013	39,931,834	40,337,089	40,580,472	40,855,034
$236,540,831	**$240,935,527**	**$245,684,035**	**$238,534,629**	**$237,061,582**	**$233,544,078**	**$239,591,005**	**$242,022,531**	**$243,482,833**	**$245,130,203**

DTE Electric Company

WP KLB-13 EWR Model 2.00%_Tiered Costs: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**221,497**	**207,049**	**210,188**	**240,297**	**267,935**	**271,049**	**267,060**	**287,838**	**281,864**	**259,123**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	25,736	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	34,369	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,667	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	2,134	13,428	25,824	12,695	22,832	27,029	11,500	2,671	2,878	2,819	13,821
HVAC Equipment	17,476	16,005	29,437	35,041	40,700	46,378	52,141	58,109	43,956	65,311	57,135	55,348
Miscellaneous	560	533	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	38,411	33,225	31,057	31,528	36,044	40,190	40,657	40,059	43,176	42,280	38,868
Commerical & Industrial	**387,974**	**538,871**	**638,588**	**650,105**	**641,533**	**606,492**	**573,885**	**567,082**	**567,826**	**544,006**	**548,179**	**569,480**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	117,561	117,561	117,561	143,563	106,967	96,155	119,436	88,473	103,924	101,328	97,447
HVAC	31,038	43,110	89,366	89,365	51,323	67,220	65,557	45,367	45,426	43,520	43,854	45,558
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	3,100	1,942	1,587	1,595	1,420	1,360	2,941	2,937
Ventilation	7,759	36,326	67,333	67,333	60,161	44,383	39,721	27,879	11,357	10,880	24,327	50,923
Cooking	1,940	2,694	7,512	7,512	3,208	7,512	7,512	2,835	2,839	2,720	2,741	2,847
Pools	970	1,347	3,025	3,025	2,195	1,428	1,104	1,104	1,104	904	1,332	1,332
Other	970	1,347	7,093	9,533	1,604	1,516	1,435	1,418	1,420	1,360	1,370	1,424
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**752,267**	**860,085**	**857,154**	**851,720**	**846,788**	**841,819**	**838,130**	**834,886**	**831,844**	**830,044**	**828,603**
Pilots	35,143	40,884	46,744	46,584	46,289	46,021	45,750	45,543	45,357	45,178	45,053	44,959
Education	21,086	24,530	28,046	27,951	27,773	27,612	27,450	27,326	27,214	27,107	27,032	26,975
Total Savings	**702,851**	**817,681**	**934,875**	**931,689**	**925,783**	**920,421**	**915,019**	**910,999**	**907,457**	**904,129**	**902,129**	**900,537**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$35,614,266**	**$53,228,757**	**$58,680,736**	**$57,061,206**	**$67,081,480**	**$74,903,804**	**$72,965,429**	**$68,397,192**	**$77,552,164**	**$79,658,338**	**$75,467,660**
Lighting	15,192,489	13,007,805	10,548,303	6,134,824	6,078,882	6,030,399	5,993,008	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	6,393,100	10,087,983	10,304,597	10,612,124	10,961,944	11,374,329	11,894,044	12,396,191	12,806,373	10,118,963	10,190,306
Electronics	3,741,531	5,147,464	6,674,669	7,583,032	8,729,315	9,855,599	11,413,096	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	792,691	4,458,193	5,232,561	6,038,878	6,859,587	7,727,301	8,705,896	9,672,171	10,461,415	10,371,994	10,368,453
HVAC Shell	1,153,480	885,433	6,360,970	12,272,016	6,062,878	10,971,019	13,079,430	5,610,199	1,314,147	1,428,958	1,422,823	7,077,811
HVAC Equipment	5,124,891	5,452,302	11,409,275	13,586,879	15,817,608	18,082,636	20,417,733	22,895,750	17,419,211	25,969,820	23,094,683	22,605,171
Miscellaneous	161,295	178,031	294,781	326,703	361,148	396,832	435,205	479,114	522,574	558,201	595,627	607,608
Cross-Cutting	5,071,274	3,757,440	3,394,583	3,240,125	3,360,374	3,923,463	4,463,702	4,606,716	4,629,503	5,089,847	5,082,536	4,763,726
Commerical & Industrial	**$58,998,406**	**$92,905,598**	**$137,413,090**	**$139,909,409**	**$117,952,663**	**$107,262,502**	**$101,435,825**	**$93,768,530**	**$91,795,784**	**$89,073,446**	**$85,635,666**	**$92,302,928**
Lighting	30,093,471	35,655,319	41,278,213	41,399,761	37,726,412	29,325,757	27,252,671	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	9,694,255	10,754,030	10,861,181	15,684,802	15,798,594	14,753,327	14,888,256	20,597,098	16,851,715	15,927,971	15,611,940
Refrigeration	2,290,235	16,595,392	18,880,385	18,986,324	19,081,449	13,724,908	12,186,624	17,005,610	11,005,843	13,635,575	13,122,733	12,411,307
HVAC	9,320,249	15,433,409	37,149,789	37,230,278	21,889,961	26,896,441	26,651,978	16,712,415	16,769,348	16,294,949	15,628,130	16,729,831
Compressed Air	2,139,099	2,921,454	3,642,154	4,043,241	4,030,827	3,476,255	3,417,165	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	432,539	488,914	492,199	426,092	278,332	234,316	238,935	213,874	210,985	244,170	246,482
Ventilation	1,055,856	5,761,365	12,195,111	12,255,787	11,018,133	8,203,913	7,390,531	5,191,621	2,124,494	2,047,185	4,875,469	10,256,590
Cooking	529,885	875,823	2,831,681	2,838,450	1,214,826	2,851,596	2,857,949	1,081,103	1,084,941	1,041,795	1,052,228	1,226,889
Pools	179,302	293,472	758,820	761,546	555,431	365,802	285,274	286,204	287,145	237,294	583,023	584,230
Other	421,161	701,384	4,305,937	5,795,445	961,039	794,308	736,973	729,431	731,598	692,105	587,326	611,439
Machine Drive	2,915,557	3,349,209	3,789,025	3,895,746	4,004,090	4,176,911	4,289,557	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,141,261	1,281,934	1,291,930	1,301,670	1,311,341	1,320,721	1,330,070	1,339,524	1,349,171	1,360,026	1,370,092
Agriculture	44,326	50,715	57,097	57,520	57,932	58,344	58,740	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$128,519,864**	**$190,641,847**	**$198,590,145**	**$175,013,870**	**$174,343,982**	**$176,339,629**	**$166,733,959**	**$160,192,976**	**$166,625,609**	**$165,294,004**	**$167,770,588**
Pilots	5,666,586	7,386,199	10,956,428	11,413,227	10,058,268	10,019,769	10,134,461	9,582,411	9,206,493	9,576,184	9,499,655	9,641,988
Education	3,399,952	4,431,719	6,573,857	6,847,936	6,034,961	6,011,861	6,080,677	5,749,447	5,523,896	5,745,711	5,699,793	5,785,193
EM&V	5,666,586	7,386,199	10,956,428	11,413,227	10,058,268	10,019,769	10,134,461	9,582,411	9,206,493	9,576,184	9,499,655	9,641,988
Performance Incentive	22,666,345	29,544,796	43,825,712	45,652,907	40,233,073	40,079,076	40,537,846	38,329,646	36,825,971	38,304,738	37,998,622	38,567,951
Total Spend	**$135,998,068**	**$177,268,778**	**$262,954,272**	**$273,917,441**	**$241,398,441**	**$240,474,458**	**$243,227,075**	**$229,977,874**	**$220,955,829**	**$229,828,427**	**$227,991,730**	**$231,407,707**

DTE Electric Company

WP KLB-13 EWR Model 2.00%_Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
210,043	**214,019**	**213,954**	**193,461**	**187,242**	**198,476**	**219,008**	**208,991**	**208,840**	**208,848**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
26,349	25,911	25,428	19,346	18,724	19,848	21,901	20,899	20,884	20,885
88,809	88,894	89,506	87,907	95,500	97,134	124,028	99,840	99,840	99,840
27,789	28,572	28,420	21,130	9,410	15,393	2,738	20,398	20,298	20,304
2,100	2,140	2,140	1,935	1,872	1,985	2,190	2,090	2,088	2,088
26,236	29,436	29,687	14,510	14,043	14,886	16,426	15,674	15,663	15,664
1,535	1,497	1,475	484	468	496	548	522	522	522
31,506	32,103	32,093	29,019	28,086	29,771	32,851	31,349	31,326	31,327
617,084	**612,366**	**611,206**	**632,189**	**638,315**	**626,864**	**606,629**	**615,781**	**615,336**	**615,360**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
201,818	180,503	144,890	161,989	170,080	181,013	161,315	145,423	145,423	145,423
39,568	51,651	81,315	30,661	30,958	31,334	29,421	50,102	49,706	49,727
49,367	48,989	48,896	50,575	51,065	50,149	48,530	49,262	49,227	49,229
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,580	1,596	1,567	1,517	1,539	1,538	1,538
12,342	12,247	12,224	12,644	12,766	12,537	12,133	12,316	12,307	12,307
3,085	3,062	3,056	3,161	3,192	3,134	3,033	3,079	3,077	3,077
1,543	1,531	1,528	1,580	1,596	1,321	1,134	1,050	1,050	1,050
1,543	1,531	1,528	1,580	1,596	1,567	1,517	1,539	1,538	1,538
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	15,805	15,958	20,567	16,942	20,567	20,567	20,567
551	551	551	901	901	901	901	901	901	901
827,127	**826,385**	**825,160**	**825,650**	**825,557**	**825,340**	**825,637**	**824,772**	**824,176**	**824,208**
44,862	44,815	44,748	44,751	44,748	44,726	44,759	44,741	44,713	44,718
26,917	26,889	26,849	26,851	26,849	26,836	26,855	26,845	26,828	26,831
898,906	**898,089**	**896,757**	**897,252**	**897,155**	**896,902**	**897,251**	**896,358**	**895,716**	**895,757**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$55,695,900	**$57,753,690**	**$58,590,286**	**$48,804,544**	**$46,653,980**	**$51,354,364**	**$57,524,198**	**$55,022,001**	**$55,505,618**	**$56,060,020**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370
10,324,705	10,281,494	10,356,761	8,050,572	7,951,789	8,564,856	9,572,427	9,265,848	9,313,172	9,368,668
15,634,918	15,550,229	15,922,036	16,160,360	19,077,571	20,085,340	29,196,740	20,355,334	20,613,572	20,877,139
10,401,650	11,053,914	11,191,546	8,418,711	3,768,235	6,191,824	1,107,102	8,327,167	8,338,842	8,394,651
1,092,332	1,094,073	1,087,038	974,080	930,919	969,019	1,078,364	1,021,433	1,026,097	1,031,651
10,845,215	12,320,622	12,592,375	6,184,330	6,033,789	6,434,334	7,103,951	6,809,442	6,845,036	6,886,652
614,797	602,869	597,345	197,007	191,790	204,505	227,020	217,961	219,154	220,541
3,935,421	4,086,366	4,162,176	3,833,736	3,779,625	4,080,195	4,585,462	4,456,663	4,534,469	4,617,347
$114,618,088	**$115,828,169**	**$118,433,283**	**$123,492,955**	**$124,674,978**	**$117,524,319**	**$115,940,505**	**$120,261,697**	**$120,863,225**	**$121,551,756**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614
21,480,547	18,678,279	14,968,261	16,142,726	18,792,509	19,485,155	16,810,026	15,811,617	15,971,825	16,133,483
5,208,731	7,329,347	13,516,332	5,281,695	4,688,734	4,804,194	4,727,291	7,919,964	7,911,526	7,970,192
18,821,712	18,927,033	17,518,190	21,801,402	22,327,667	22,374,485	21,685,808	23,116,311	23,153,230	23,208,855
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112
249,200	251,976	234,152	297,043	323,078	318,888	310,180	318,082	326,419	328,142
2,499,809	2,493,038	2,511,707	2,458,358	2,498,180	2,467,816	2,401,737	2,455,244	2,466,874	2,480,651
1,190,145	1,183,939	1,184,642	1,228,422	1,243,531	1,224,435	1,188,082	1,209,292	1,211,770	1,215,237
404,094	402,452	383,240	339,704	339,806	335,985	312,959	276,553	277,697	278,863
663,979	660,349	660,571	779,710	788,868	776,322	752,848	745,564	752,009	753,748
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354
1,380,368	1,390,859	1,401,561	2,007,310	2,042,788	2,653,883	2,203,867	2,697,346	2,719,747	2,742,610
81,974	82,495	83,026	122,178	123,083	124,006	124,949	125,911	126,892	127,893
$170,313,987	**$173,581,860**	**$177,023,568**	**$172,297,499**	**$171,328,959**	**$168,878,682**	**$173,464,703**	**$175,283,697**	**$176,368,844**	**$177,611,776**
9,788,160	9,975,969	10,173,768	9,902,155	9,846,492	9,705,671	9,969,236	10,073,776	10,136,140	10,207,573
5,872,896	5,985,581	6,104,261	5,941,293	5,907,895	5,823,403	5,981,541	6,044,265	6,081,684	6,124,544
9,788,160	9,975,969	10,173,768	9,902,155	9,846,492	9,705,671	9,969,236	10,073,776	10,136,140	10,207,573
39,152,641	39,903,876	40,695,073	39,608,620	39,385,968	38,822,686	39,876,943	40,295,103	40,544,562	40,830,293
$234,915,845	**$239,423,255**	**$244,170,439**	**$237,651,723**	**$236,315,805**	**$232,936,114**	**$239,261,659**	**$241,770,617**	**$243,267,371**	**$244,981,760**

DTE Electric Company

WP KLB-14 EWR Model 2.00%_Flat Costs High: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**221,497**	**207,049**	**210,188**	**240,297**	**267,935**	**271,049**	**267,060**	**287,838**	**281,864**	**259,123**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	25,736	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	34,369	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,667	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	2,134	13,428	25,824	12,695	22,832	27,029	11,500	2,671	2,878	2,819	13,821
HVAC Equipment	17,476	16,005	29,437	35,041	40,700	46,378	52,141	58,109	43,956	65,311	57,135	55,348
Miscellaneous	560	533	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	38,411	33,225	31,057	31,528	36,044	40,190	40,657	40,059	43,176	42,280	38,868
Commerical & Industrial	**387,974**	**538,871**	**638,588**	**650,105**	**641,533**	**606,492**	**573,885**	**567,082**	**567,826**	**544,006**	**548,179**	**569,480**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	117,561	117,561	117,561	143,563	106,967	96,155	119,436	88,473	103,924	101,328	97,447
HVAC	31,038	43,110	89,366	89,365	51,323	67,220	65,557	45,367	45,426	43,520	43,854	45,558
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	3,100	1,942	1,587	1,595	1,420	1,360	2,941	2,937
Ventilation	7,759	36,326	67,333	67,333	60,161	44,383	39,721	27,879	11,357	10,880	24,327	50,923
Cooking	1,940	2,694	7,512	7,512	3,208	7,512	7,512	2,835	2,839	2,720	2,741	2,847
Pools	970	1,347	3,025	3,025	2,195	1,428	1,104	1,104	1,104	904	1,332	1,332
Other	970	1,347	7,093	9,533	1,604	1,516	1,435	1,418	1,420	1,360	1,370	1,424
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**752,267**	**860,085**	**857,154**	**851,720**	**846,788**	**841,819**	**838,130**	**834,886**	**831,844**	**830,044**	**828,603**
Pilots	35,143	40,884	46,744	46,584	46,289	46,021	45,750	45,543	45,357	45,178	45,053	44,959
Education	21,086	24,530	28,046	27,951	27,773	27,612	27,450	27,326	27,214	27,107	27,032	26,975
Total Savings	**702,851**	**817,681**	**934,875**	**931,689**	**925,783**	**920,421**	**915,019**	**910,999**	**907,457**	**904,129**	**902,129**	**900,537**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$38,650,013**	**$53,228,757**	**$58,680,736**	**$57,061,206**	**$67,081,480**	**$74,903,804**	**$72,965,429**	**$68,397,192**	**$77,552,164**	**$79,658,338**	**$75,467,660**
Lighting	15,192,489	13,879,077	10,548,303	6,134,824	6,078,882	6,030,399	5,993,008	5,983,392	5,956,958	3,241,454	2,961,662	2,818,290
Appliances	7,176,137	7,129,449	10,087,983	10,304,597	10,612,124	10,961,944	11,374,329	11,894,044	12,396,191	12,806,373	10,118,963	10,190,306
Electronics	3,741,531	5,532,539	6,674,669	7,583,032	8,729,315	9,855,599	11,413,096	12,790,319	16,486,437	17,996,097	26,010,048	17,036,295
Water Heating	1,979,097	891,964	4,458,193	5,232,561	6,038,878	6,859,587	7,727,301	8,705,896	9,672,171	10,461,415	10,371,994	10,368,453
HVAC Shell	1,153,480	1,009,194	6,360,970	12,272,016	6,062,878	10,971,019	13,079,430	5,610,199	1,314,147	1,428,958	1,422,823	7,077,811
HVAC Equipment	5,124,891	6,170,789	11,409,275	13,586,879	15,817,608	18,082,636	20,417,733	22,895,750	17,419,211	25,969,820	23,094,683	22,605,171
Miscellaneous	161,295	201,325	294,781	326,703	361,148	396,832	435,205	479,114	522,574	558,201	595,627	607,608
Cross-Cutting	5,071,274	3,835,676	3,394,583	3,240,125	3,360,374	3,923,463	4,463,702	4,606,716	4,629,503	5,089,847	5,082,536	4,763,726
Commerical & Industrial	**$58,998,406**	**$105,845,762**	**$137,413,090**	**$139,909,409**	**$117,952,663**	**$107,262,502**	**$101,435,825**	**$93,768,530**	**$91,795,784**	**$89,073,446**	**$85,635,666**	**$92,302,928**
Lighting	30,093,471	41,089,903	41,278,213	41,399,761	37,726,412	29,325,757	27,252,671	28,241,269	29,272,075	28,203,460	23,724,499	24,545,121
Office Equipment	8,632,730	10,642,638	10,754,030	10,861,181	15,684,802	15,798,594	14,753,327	14,888,256	20,597,098	16,851,715	15,927,971	15,611,940
Refrigeration	2,290,235	18,770,255	18,880,385	18,986,324	19,081,449	13,724,908	12,186,624	17,005,610	11,005,843	13,635,575	13,122,733	12,411,307
HVAC	9,320,249	17,880,557	37,149,789	37,230,278	21,889,961	26,896,441	26,651,978	16,712,415	16,769,348	16,294,949	15,628,130	16,729,831
Compressed Air	2,139,099	3,253,762	3,642,154	4,043,241	4,030,827	3,476,255	3,417,165	3,599,931	3,787,809	3,805,396	3,614,501	3,663,604
Water Heating	376,110	485,500	488,914	492,199	426,092	278,332	234,316	238,935	213,874	210,985	244,170	246,482
Ventilation	1,055,856	6,545,175	12,195,111	12,255,787	11,018,133	8,203,913	7,390,531	5,191,621	2,124,494	2,047,185	4,875,469	10,256,590
Cooking	529,885	1,013,106	2,831,681	2,838,450	1,214,826	2,851,596	2,857,949	1,081,103	1,084,941	1,041,795	1,052,228	1,226,889
Pools	179,302	336,624	758,820	761,546	555,431	365,802	285,274	286,204	287,145	237,294	583,023	584,230
Other	421,161	816,521	4,305,937	5,795,445	961,039	794,308	736,973	729,431	731,598	692,105	587,326	611,439
Machine Drive	2,915,557	3,683,523	3,789,025	3,895,746	4,004,090	4,176,911	4,289,557	4,404,549	4,522,499	4,643,872	4,834,628	4,963,941
Process Cooling & Heating	1,000,425	1,271,543	1,281,934	1,291,930	1,301,670	1,311,341	1,320,721	1,330,070	1,339,524	1,349,171	1,360,026	1,370,092
Agriculture	44,326	56,658	57,097	57,520	57,932	58,344	58,740	59,136	59,535	59,943	80,964	81,463
Overall Program (Res + C&I)	**$98,598,600**	**$144,495,775**	**$190,641,847**	**$198,590,145**	**$175,013,870**	**$174,343,982**	**$176,339,629**	**$166,733,959**	**$160,192,976**	**$166,625,609**	**$165,294,004**	**$167,770,588**
Pilots	5,666,586	8,304,355	10,956,428	11,413,227	10,058,268	10,019,769	10,134,461	9,582,411	9,206,493	9,576,184	9,499,655	9,641,988
Education	3,399,952	4,982,613	6,573,857	6,847,936	6,034,961	6,011,861	6,080,677	5,749,447	5,523,896	5,745,711	5,699,793	5,785,193
EM&V	5,666,586	8,304,355	10,956,428	11,413,227	10,058,268	10,019,769	10,134,461	9,582,411	9,206,493	9,576,184	9,499,655	9,641,988
Performance Incentive	22,666,345	33,217,420	43,825,712	45,652,907	40,233,073	40,079,076	40,537,846	38,329,646	36,825,971	38,304,738	37,998,622	38,567,951
Total Spend	**$135,998,068**	**$199,304,517**	**$262,954,272**	**$273,917,441**	**$241,398,441**	**$240,474,458**	**$243,227,075**	**$229,977,874**	**$220,955,829**	**$229,828,427**	**$227,991,730**	**$231,407,707**

DTE Electric Company

WP KLB-14 EWR Model 2.00%_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
210,043	**214,019**	**213,954**	**193,461**	**187,242**	**198,476**	**219,008**	**208,991**	**208,840**	**208,848**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
26,349	25,911	25,428	19,346	18,724	19,848	21,901	20,899	20,884	20,885
88,809	88,894	89,506	87,907	95,500	97,134	124,028	99,840	99,840	99,840
27,789	28,572	28,420	21,130	9,410	15,393	2,738	20,398	20,298	20,304
2,100	2,140	2,140	1,935	1,872	1,985	2,190	2,090	2,088	2,088
26,236	29,436	29,687	14,510	14,043	14,886	16,426	15,674	15,663	15,664
1,535	1,497	1,475	484	468	496	548	522	522	522
31,506	32,103	32,093	29,019	28,086	29,771	32,851	31,349	31,326	31,327
617,084	**612,366**	**611,206**	**632,189**	**638,315**	**626,864**	**606,629**	**615,781**	**615,336**	**615,360**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
201,818	180,503	144,890	161,989	170,080	181,013	161,315	145,423	145,423	145,423
39,568	51,651	81,315	30,661	30,958	31,334	29,421	50,102	49,706	49,727
49,367	48,989	48,896	50,575	51,065	50,149	48,530	49,262	49,227	49,229
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,580	1,596	1,567	1,517	1,539	1,538	1,538
12,342	12,247	12,224	12,644	12,766	12,537	12,133	12,316	12,307	12,307
3,085	3,062	3,056	3,161	3,192	3,134	3,033	3,079	3,077	3,077
1,543	1,531	1,528	1,580	1,596	1,321	1,134	1,050	1,050	1,050
1,543	1,531	1,528	1,580	1,596	1,567	1,517	1,539	1,538	1,538
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	15,805	15,958	20,567	16,942	20,567	20,567	20,567
551	551	551	901	901	901	901	901	901	901
827,127	**826,385**	**825,160**	**825,650**	**825,557**	**825,340**	**825,637**	**824,772**	**824,176**	**824,208**
44,862	44,815	44,748	44,751	44,748	44,726	44,759	44,741	44,713	44,718
26,917	26,889	26,849	26,851	26,849	26,836	26,855	26,845	26,828	26,831
898,906	**898,089**	**896,757**	**897,252**	**897,155**	**896,902**	**897,251**	**896,358**	**895,716**	**895,757**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$55,695,900	**$57,753,690**	**$58,590,286**	**$48,804,544**	**$46,653,980**	**$51,354,364**	**$57,524,198**	**$55,022,001**	**$55,505,618**	**$56,060,020**
2,846,863	2,764,123	2,681,009	4,985,749	4,920,263	4,824,291	4,653,131	4,568,152	4,615,275	4,663,370
10,324,705	10,281,494	10,356,761	8,050,572	7,951,789	8,564,856	9,572,427	9,265,848	9,313,172	9,368,668
15,634,918	15,550,229	15,922,036	16,160,360	19,077,571	20,085,340	29,196,740	20,355,334	20,613,572	20,877,139
10,401,650	11,053,914	11,191,546	8,418,711	3,768,235	6,191,824	1,107,102	8,327,167	8,338,842	8,394,651
1,092,332	1,094,073	1,087,038	974,080	930,919	969,019	1,078,364	1,021,433	1,026,097	1,031,651
10,845,215	12,320,622	12,592,375	6,184,330	6,033,789	6,434,334	7,103,951	6,809,442	6,845,036	6,886,652
614,797	602,869	597,345	197,007	191,790	204,505	227,020	217,961	219,154	220,541
3,935,421	4,086,366	4,162,176	3,833,736	3,779,625	4,080,195	4,585,462	4,456,663	4,534,469	4,617,347
$114,618,088	**$115,828,169**	**$118,433,283**	**$123,492,955**	**$124,674,978**	**$117,524,319**	**$115,940,505**	**$120,261,697**	**$120,863,225**	**$121,551,756**
53,826,792	54,158,535	55,335,754	58,104,443	56,371,859	47,756,689	50,370,350	50,548,431	50,730,147	50,915,614
21,480,547	18,678,279	14,968,261	16,142,726	18,792,509	19,485,155	16,810,026	15,811,617	15,971,825	16,133,483
5,208,731	7,329,347	13,516,332	5,281,695	4,688,734	4,804,194	4,727,291	7,919,964	7,911,526	7,970,192
18,821,712	18,927,033	17,518,190	21,801,402	22,327,667	22,374,485	21,685,808	23,116,311	23,153,230	23,208,855
3,713,728	5,035,921	5,246,493	5,953,656	5,976,446	5,856,952	5,514,711	5,302,250	5,369,982	5,439,112
249,200	251,976	234,152	297,043	323,078	318,888	310,180	318,082	326,419	328,142
2,499,809	2,493,038	2,511,707	2,458,358	2,498,180	2,467,816	2,401,737	2,455,244	2,466,874	2,480,651
1,190,145	1,183,939	1,184,642	1,228,422	1,243,531	1,224,435	1,188,082	1,209,292	1,211,770	1,215,237
404,094	402,452	383,240	339,704	339,806	335,985	312,959	276,553	277,697	278,863
663,979	660,349	660,571	779,710	788,868	776,322	752,848	745,564	752,009	753,748
5,097,008	5,233,946	5,389,354	8,976,309	9,158,427	9,345,508	9,537,697	9,735,129	9,845,107	9,957,354
1,380,368	1,390,859	1,401,561	2,007,310	2,042,788	2,653,883	2,203,867	2,697,346	2,719,747	2,742,610
81,974	82,495	83,026	122,178	123,083	124,006	124,949	125,911	126,892	127,893
$170,313,987	**$173,581,860**	**$177,023,568**	**$172,297,499**	**$171,328,959**	**$168,878,682**	**$173,464,703**	**$175,283,697**	**$176,368,844**	**$177,611,776**
9,788,160	9,975,969	10,173,768	9,902,155	9,846,492	9,705,671	9,969,236	10,073,776	10,136,140	10,207,573
5,872,896	5,985,581	6,104,261	5,941,293	5,907,895	5,823,403	5,981,541	6,044,265	6,081,684	6,124,544
9,788,160	9,975,969	10,173,768	9,902,155	9,846,492	9,705,671	9,969,236	10,073,776	10,136,140	10,207,573
39,152,641	39,903,876	40,695,073	39,608,620	39,385,968	38,822,686	39,876,943	40,295,103	40,544,562	40,830,293
$234,915,845	**$239,423,255**	**$244,170,439**	**$237,651,723**	**$236,315,805**	**$232,936,114**	**$239,261,659**	**$241,770,617**	**$243,267,371**	**$244,981,760**

DTE Electric Company

WP KLB-15 EWR Model 2.00%_Flat Costs Low: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**221,497**	**207,049**	**210,188**	**240,297**	**267,935**	**271,049**	**267,060**	**287,838**	**281,864**	**259,123**
Lighting	114,825	93,540	54,423	16,298	16,694	17,160	17,732	18,479	19,198	6,424	5,631	5,449
Appliances	33,138	25,736	36,095	36,896	37,896	38,981	40,199	41,642	43,032	44,332	26,631	26,348
Electronics	27,392	34,369	40,919	45,702	52,148	58,095	67,489	74,925	89,935	95,592	117,469	89,681
Water Heating	7,716	2,667	13,194	15,374	17,586	19,777	22,032	24,508	26,877	28,709	28,396	28,080
HVAC Shell	3,225	2,134	13,428	25,824	12,695	22,832	27,029	11,500	2,671	2,878	2,819	13,821
HVAC Equipment	17,476	16,005	29,437	35,041	40,700	46,378	52,141	58,109	43,956	65,311	57,135	55,348
Miscellaneous	560	533	777	856	941	1,028	1,122	1,229	1,333	1,417	1,504	1,526
Cross-Cutting	54,316	38,411	33,225	31,057	31,528	36,044	40,190	40,657	40,059	43,176	42,280	38,868
Commerical & Industrial	**387,974**	**538,871**	**638,588**	**650,105**	**641,533**	**606,492**	**573,885**	**567,082**	**567,826**	**544,006**	**548,179**	**569,480**
Lighting	133,750	133,750	134,883	134,883	123,744	96,745	91,901	94,340	97,472	95,283	81,465	84,042
Office Equipment	118,907	118,907	118,907	118,907	148,444	172,873	160,085	160,085	201,098	163,931	168,126	160,805
Refrigeration	18,817	117,561	117,561	117,561	143,563	106,967	96,155	119,436	88,473	103,924	101,328	97,447
HVAC	31,038	43,110	89,366	89,365	51,323	67,220	65,557	45,367	45,426	43,520	43,854	45,558
Compressed Air	20,043	28,581	36,191	43,800	48,184	47,609	49,064	51,790	54,517	55,954	54,148	54,148
Water Heating	3,645	3,645	3,645	3,645	3,100	1,942	1,587	1,595	1,420	1,360	2,941	2,937
Ventilation	7,759	36,326	67,333	67,333	60,161	44,383	39,721	27,879	11,357	10,880	24,327	50,923
Cooking	1,940	2,694	7,512	7,512	3,208	7,512	7,512	2,835	2,839	2,720	2,741	2,847
Pools	970	1,347	3,025	3,025	2,195	1,428	1,104	1,104	1,104	904	1,332	1,332
Other	970	1,347	7,093	9,533	1,604	1,516	1,435	1,418	1,420	1,360	1,370	1,424
Machine Drive	38,573	40,041	41,510	42,978	44,447	46,735	48,203	49,671	51,140	52,608	54,896	56,365
Process Cooling & Heating	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,092	11,100	11,100
Agriculture	469	469	469	469	469	469	469	469	469	469	551	551
Overall Program (Res + C&I)	**646,623**	**752,267**	**860,085**	**857,154**	**851,720**	**846,788**	**841,819**	**838,130**	**834,886**	**831,844**	**830,044**	**828,603**
Pilots	35,143	40,884	46,744	46,584	46,289	46,021	45,750	45,543	45,357	45,178	45,053	44,959
Education	21,086	24,530	28,046	27,951	27,773	27,612	27,450	27,326	27,214	27,107	27,032	26,975
Total Savings	**702,851**	**817,681**	**934,875**	**931,689**	**925,783**	**920,421**	**915,019**	**910,999**	**907,457**	**904,129**	**902,129**	**900,537**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$32,578,518**	**$43,141,160**	**$46,706,859**	**$45,790,028**	**$53,791,078**	**$60,214,149**	**$59,110,494**	**$55,956,646**	**$63,172,033**	**$64,640,751**	**$61,158,227**
Lighting	15,192,489	12,136,533	8,828,801	4,737,578	4,719,635	4,709,323	4,710,094	4,736,136	4,750,607	2,467,314	2,250,566	2,148,004
Appliances	7,176,137	5,656,751	8,019,962	8,216,553	8,482,714	8,781,986	9,129,516	9,560,221	9,979,049	10,332,968	7,922,275	7,980,316
Electronics	3,741,531	4,762,388	5,758,710	6,550,910	7,561,206	8,551,149	9,949,215	11,174,210	14,261,053	15,548,181	21,907,812	14,808,675
Water Heating	1,979,097	693,419	3,471,060	4,080,856	4,716,424	5,364,165	6,048,965	6,820,622	7,583,554	8,209,228	8,154,978	8,160,711
HVAC Shell	1,153,480	761,671	4,809,218	9,292,653	4,597,180	8,329,062	9,940,597	4,268,044	1,000,689	1,089,126	1,084,776	5,398,826
HVAC Equipment	5,124,891	4,733,815	8,768,081	10,463,706	12,204,551	13,976,835	15,806,721	17,749,552	13,523,114	20,195,019	17,966,269	17,603,081
Miscellaneous	161,295	154,737	226,966	251,965	278,979	307,029	337,227	371,805	406,135	434,476	464,312	474,376
Cross-Cutting	5,071,274	3,679,205	3,258,363	3,112,639	3,229,339	3,771,531	4,291,814	4,429,905	4,452,444	4,895,720	4,889,763	4,584,238
Commerical & Industrial	**$58,998,406**	**$79,965,435**	**$103,328,891**	**$105,380,830**	**$90,081,945**	**$82,346,986**	**$78,023,403**	**$72,716,488**	**$71,490,038**	**$69,422,934**	**$67,217,177**	**$72,321,760**
Lighting	30,093,471	30,220,735	30,402,809	30,524,357	27,858,058	21,686,632	20,200,769	20,946,474	21,732,060	20,981,008	17,687,868	18,319,364
Office Equipment	8,632,730	8,745,871	8,857,263	8,964,415	12,718,277	13,129,310	12,285,094	12,420,023	16,979,561	13,927,133	13,379,959	13,105,369
Refrigeration	2,290,235	14,420,529	14,530,660	14,636,598	15,038,746	10,888,458	9,706,568	13,394,770	8,831,060	10,895,809	10,530,136	10,007,174
HVAC	9,320,249	12,986,262	27,004,004	27,084,497	15,924,179	19,632,524	19,458,113	12,264,972	12,317,183	11,972,186	11,521,468	12,327,658
Compressed Air	2,139,099	2,589,147	2,954,135	3,331,819	3,386,019	3,003,539	2,992,038	3,166,419	3,345,910	3,391,118	3,248,480	3,297,582
Water Heating	376,110	379,579	382,993	386,278	334,574	218,089	183,434	187,163	167,794	165,369	209,939	212,296
Ventilation	1,055,856	4,977,555	9,289,396	9,350,073	8,417,437	6,274,257	5,659,137	3,982,129	1,631,806	1,574,460	3,735,556	7,869,017
Cooking	529,885	738,541	2,066,166	2,072,936	887,954	2,086,082	2,092,434	792,165	795,624	764,614	772,921	897,371
Pools	179,302	250,320	565,000	567,726	414,512	273,164	213,189	214,120	215,060	177,857	425,781	426,988
Other	421,161	586,248	3,093,464	4,165,973	691,515	574,174	533,427	528,298	530,201	502,152	429,309	447,281
Machine Drive	2,915,557	3,014,895	3,116,417	3,219,158	3,323,522	3,483,522	3,592,188	3,703,200	3,817,170	3,934,563	4,112,498	4,237,831
Process Cooling & Heating	1,000,425	1,010,980	1,021,371	1,031,366	1,041,106	1,050,777	1,060,157	1,069,506	1,078,960	1,088,608	1,099,277	1,109,343
Agriculture	44,326	44,773	45,212	45,635	46,046	46,458	46,854	47,250	47,649	48,057	63,986	64,486
Overall Program (Res + C&I)	**$98,598,600**	**$112,543,953**	**$146,470,051**	**$152,087,689**	**$135,871,973**	**$136,138,064**	**$138,237,552**	**$131,826,982**	**$127,446,684**	**$132,594,966**	**$131,857,928**	**$133,479,987**
Pilots	5,666,586	6,468,043	8,417,819	8,740,672	7,808,734	7,824,027	7,944,687	7,576,263	7,324,522	7,620,400	7,578,042	7,671,264
Education	3,399,952	3,880,826	5,050,691	5,244,403	4,685,240	4,694,416	4,766,812	4,545,758	4,394,713	4,572,240	4,546,825	4,602,758
EM&V	5,666,586	6,468,043	8,417,819	8,740,672	7,808,734	7,824,027	7,944,687	7,576,263	7,324,522	7,620,400	7,578,042	7,671,264
Performance Incentive	22,666,345	25,872,173	33,671,276	34,962,687	31,234,936	31,296,107	31,778,748	30,305,053	29,298,088	30,481,601	30,312,167	30,685,054
Total Spend	**$135,998,068**	**$155,233,039**	**$202,027,657**	**$209,776,123**	**$187,409,617**	**$187,776,640**	**$190,672,486**	**$181,830,320**	**$175,788,529**	**$182,889,609**	**$181,873,004**	**$184,110,326**

DTE Electric Company

WP KLB-15 EWR Model 2.00%_Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
210,043	**214,019**	**213,954**	**193,461**	**187,242**	**198,476**	**219,008**	**208,991**	**208,840**	**208,848**
5,718	5,465	5,206	19,131	19,138	18,964	18,328	18,219	18,219	18,219
26,349	25,911	25,428	19,346	18,724	19,848	21,901	20,899	20,884	20,885
88,809	88,894	89,506	87,907	95,500	97,134	124,028	99,840	99,840	99,840
27,789	28,572	28,420	21,130	9,410	15,393	2,738	20,398	20,298	20,304
2,100	2,140	2,140	1,935	1,872	1,985	2,190	2,090	2,088	2,088
26,236	29,436	29,687	14,510	14,043	14,886	16,426	15,674	15,663	15,664
1,535	1,497	1,475	484	468	496	548	522	522	522
31,506	32,103	32,093	29,019	28,086	29,771	32,851	31,349	31,326	31,327
617,084	**612,366**	**611,206**	**632,189**	**638,315**	**626,864**	**606,629**	**615,781**	**615,336**	**615,360**
181,250	181,976	185,549	191,641	187,226	160,227	166,841	166,841	166,841	166,841
201,818	180,503	144,890	161,989	170,080	181,013	161,315	145,423	145,423	145,423
39,568	51,651	81,315	30,661	30,958	31,334	29,421	50,102	49,706	49,727
49,367	48,989	48,896	50,575	51,065	50,149	48,530	49,262	49,227	49,229
54,148	56,985	57,166	64,969	64,813	64,509	63,839	62,187	62,187	62,187
2,937	2,937	2,536	1,580	1,596	1,567	1,517	1,539	1,538	1,538
12,342	12,247	12,224	12,644	12,766	12,537	12,133	12,316	12,307	12,307
3,085	3,062	3,056	3,161	3,192	3,134	3,033	3,079	3,077	3,077
1,543	1,531	1,528	1,580	1,596	1,321	1,134	1,050	1,050	1,050
1,543	1,531	1,528	1,580	1,596	1,567	1,517	1,539	1,538	1,538
57,833	59,301	60,865	95,101	96,569	98,038	99,506	100,975	100,975	100,975
11,100	11,100	11,100	15,805	15,958	20,567	16,942	20,567	20,567	20,567
551	551	551	901	901	901	901	901	901	901
827,127	**826,385**	**825,160**	**825,650**	**825,557**	**825,340**	**825,637**	**824,772**	**824,176**	**824,208**
44,862	44,815	44,748	44,751	44,748	44,726	44,759	44,741	44,713	44,718
26,917	26,889	26,849	26,851	26,849	26,836	26,855	26,845	26,828	26,831
898,906	**898,089**	**896,757**	**897,252**	**897,155**	**896,902**	**897,251**	**896,358**	**895,716**	**895,757**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$45,878,596	**$47,593,592**	**$48,324,017**	**$40,909,360**	**$39,321,061**	**$43,156,024**	**$48,383,736**	**$46,419,880**	**$46,914,754**	**$47,468,551**
2,180,395	2,117,880	2,054,599	4,157,152	4,125,225	4,065,705	3,936,440	3,886,772	3,933,895	3,981,991
8,091,800	8,064,635	8,118,595	6,310,018	6,232,580	6,716,196	7,512,379	7,276,542	7,325,303	7,380,722
13,858,255	13,861,591	14,203,847	14,377,644	16,752,796	17,587,303	25,034,389	18,024,881	18,283,119	18,546,686
8,192,907	8,694,426	8,805,192	6,629,922	2,972,647	4,893,289	876,432	6,600,522	6,620,663	6,676,016
833,547	837,511	834,035	749,317	718,276	750,393	836,023	794,048	798,876	804,421
8,452,449	9,610,058	9,829,063	4,834,994	4,723,398	5,044,631	5,581,525	5,359,445	5,396,087	5,437,647
480,728	472,134	468,540	154,770	150,911	161,173	179,206	172,334	173,560	174,945
3,788,514	3,935,357	4,010,146	3,695,542	3,645,229	3,937,332	4,427,343	4,305,336	4,383,252	4,466,123
$88,758,220	**$89,713,718**	**$91,697,725**	**$95,728,032**	**$96,837,712**	**$91,853,372**	**$90,625,587**	**$93,990,432**	**$94,605,479**	**$95,293,056**
40,182,883	40,476,734	41,404,824	43,487,143	42,265,898	35,879,957	37,863,010	38,041,091	38,222,807	38,408,274
17,824,671	15,619,786	12,562,552	13,678,535	15,703,418	16,407,752	14,284,544	13,384,218	13,543,880	13,705,538
4,192,783	5,858,795	10,631,449	4,147,410	3,746,027	3,842,115	3,768,265	6,341,920	6,345,950	6,403,946
13,857,243	13,939,643	12,966,287	16,003,618	16,394,585	16,429,048	15,937,444	16,965,998	17,007,359	17,062,744
3,347,707	4,328,602	4,495,090	5,121,553	5,154,743	5,086,369	4,856,593	4,702,004	4,769,736	4,838,866
215,014	217,790	200,400	231,138	250,068	247,187	240,794	247,175	253,497	255,217
1,920,378	1,917,807	1,934,083	1,906,510	1,940,031	1,919,198	1,870,560	1,914,816	1,926,836	1,940,593
875,729	871,927	873,222	906,310	918,298	905,036	878,993	895,541	898,245	901,700
304,180	303,301	290,254	261,000	261,778	255,392	236,772	210,302	211,446	212,612
486,099	483,829	484,386	569,004	576,121	567,391	550,662	546,413	551,409	553,141
4,366,918	4,499,876	4,648,318	7,679,865	7,858,002	8,041,103	8,229,312	8,422,764	8,532,742	8,644,989
1,119,619	1,130,110	1,140,812	1,637,191	1,669,082	2,172,240	1,807,111	2,215,703	2,238,104	2,260,967
64,996	65,517	66,048	98,755	99,660	100,583	101,526	102,487	103,469	104,470
$134,636,816	**$137,307,310**	**$140,021,742**	**$136,637,392**	**$136,158,774**	**$135,009,396**	**$139,009,323**	**$140,410,313**	**$141,520,233**	**$142,761,607**
7,737,748	7,891,225	8,047,227	7,852,724	7,825,217	7,759,161	7,989,042	8,069,558	8,133,347	8,204,690
4,642,649	4,734,735	4,828,336	4,711,634	4,695,130	4,655,496	4,793,425	4,841,735	4,880,008	4,922,814
7,737,748	7,891,225	8,047,227	7,852,724	7,825,217	7,759,161	7,989,042	8,069,558	8,133,347	8,204,690
30,950,992	31,564,899	32,188,906	31,410,895	31,300,868	31,036,643	31,956,166	32,278,233	32,533,387	32,818,760
$185,705,953	**$189,389,394**	**$193,133,437**	**$188,465,369**	**$187,805,205**	**$186,219,857**	**$191,736,998**	**$193,669,397**	**$195,200,321**	**$196,912,561**

DTE Electric Company

WP KLB-16 EWR Model 2.25% Flat Costs Low: Output

Case No: U-20471
Workpaper: KLB-16
Page: 1 of 2
Witness: K. L. Bilyeu

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**221,497**	**227,059**	**235,306**	**268,370**	**298,527**	**301,425**	**296,467**	**318,996**	**312,074**	**286,671**
Lighting	117,831	98,338	58,514	17,874	18,666	19,539	20,540	21,761	22,963	10,235	9,044	8,487
Appliances	27,141	21,340	40,147	42,226	44,506	46,872	49,390	52,188	54,927	57,564	32,541	38,021
Electronics	29,504	33,967	47,418	54,073	62,644	70,629	82,855	92,724	111,095	118,868	163,371	104,872
Water Heating	8,250	2,667	14,802	17,441	20,099	22,719	25,396	28,314	31,094	33,235	33,000	32,571
HVAC Shell	2,586	2,134	2,215	22,114	8,234	15,825	16,283	3,014	2,965	3,190	3,121	2,867
HVAC Equipment	18,392	16,005	24,623	38,704	45,273	51,861	58,536	57,456	28,211	47,258	23,406	56,136
Miscellaneous	628	533	554	568	588	671	746	754	741	797	780	717
Cross-Cutting	54,316	38,411	33,225	34,059	35,296	40,256	44,779	45,214	44,470	47,849	46,811	43,001
Commerical & Industrial	**387,974**	**538,871**	**638,588**	**734,821**	**718,198**	**677,348**	**639,409**	**630,634**	**630,350**	**602,893**	**606,932**	**630,024**
Lighting	151,964	151,964	153,302	153,302	140,454	109,247	103,686	106,180	109,517	107,027	90,964	93,946
Office Equipment	135,243	135,243	135,243	135,243	168,691	196,732	182,188	182,188	228,712	186,448	191,276	182,921
Refrigeration	18,817	99,484	130,125	130,125	160,505	119,990	108,019	131,304	135,914	147,121	111,916	108,035
HVAC	31,038	43,110	51,087	112,594	57,456	68,956	65,904	50,451	50,428	48,231	48,555	50,402
Compressed Air	21,330	32,327	41,023	49,718	54,773	54,208	55,899	59,015	62,131	63,791	61,744	61,744
Water Heating	970	4,275	4,275	4,275	3,634	2,273	1,856	1,863	1,576	1,507	3,447	3,442
Ventilation	7,759	10,777	59,225	77,004	64,340	51,114	45,855	26,788	12,607	12,058	20,374	49,084
Cooking	1,940	2,694	3,193	7,908	3,591	7,908	7,908	3,153	3,152	3,014	3,035	3,150
Pools	970	1,347	1,596	3,272	1,795	1,543	1,192	1,192	1,192	976	1,332	1,332
Other	970	1,347	1,596	1,837	1,795	1,693	1,599	1,577	1,576	1,507	1,517	1,575
Machine Drive	6,790	43,789	45,409	47,029	48,649	51,169	52,789	54,409	11,031	18,698	60,170	61,790
Process Cooling & Heating	9,699	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,038	12,038
Agriculture	484	484	484	484	484	484	484	484	484	484	566	566
Overall Program (Res + C&I)	**646,623**	**752,267**	**860,085**	**961,879**	**953,504**	**945,718**	**937,936**	**932,059**	**926,817**	**921,890**	**919,006**	**916,695**
Pilots	35,143	40,884	46,744	52,276	51,821	51,397	50,972	50,649	50,355	50,066	49,871	49,714
Education	21,086	24,530	28,046	31,366	31,092	30,838	30,583	30,389	30,213	30,040	29,923	29,828
Total Savings	**702,851**	**817,681**	**934,875**	**1,045,521**	**1,036,417**	**1,027,953**	**1,019,491**	**1,013,098**	**1,007,384**	**1,001,996**	**998,800**	**996,238**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$48,252,267**	**$39,454,082**	**$50,076,586**	**$61,198,571**	**$60,831,764**	**$70,347,756**	**$77,507,815**	**$75,498,377**	**$72,561,532**	**$80,527,259**	**$86,658,134**	**$75,568,269**
Lighting	19,627,098	15,567,298	12,236,662	7,092,167	7,046,744	7,003,119	6,967,816	6,968,091	6,937,584	3,585,283	3,135,394	2,871,033
Appliances	7,825,626	6,188,090	11,667,976	12,191,362	12,817,533	13,493,590	14,248,712	15,145,301	16,025,757	16,803,315	11,320,024	13,561,491
Electronics	5,538,286	6,433,192	9,081,370	10,523,753	12,259,654	13,984,659	16,282,234	18,361,497	23,674,825	26,088,353	46,309,164	21,649,104
Water Heating	2,221,404	721,062	4,027,493	4,768,083	5,537,364	6,319,635	7,145,296	8,075,016	8,992,852	9,741,779	9,675,964	9,650,669
HVAC Shell	1,103,846	913,602	953,478	9,558,886	3,580,550	6,930,730	7,191,104	1,344,453	1,336,052	1,451,420	1,445,610	1,351,757
HVAC Equipment	6,047,545	5,321,646	8,256,584	13,038,836	15,333,349	17,663,220	20,055,997	19,821,911	9,797,039	16,496,338	8,428,411	20,547,371
Miscellaneous	308,925	263,444	274,677	282,789	294,287	337,028	376,399	381,562	376,785	407,065	399,882	368,875
Cross-Cutting	5,579,536	4,045,748	3,578,346	3,742,695	3,962,283	4,615,777	5,240,256	5,400,546	5,420,636	5,953,707	5,943,686	5,567,970
Commerical & Industrial	**$67,099,328**	**$87,256,901**	**$102,311,738**	**$125,826,603**	**$108,928,761**	**$99,521,919**	**$94,447,595**	**$88,237,606**	**$86,134,436**	**$84,025,282**	**$81,992,987**	**$88,968,977**
Lighting	39,143,040	39,287,630	39,500,825	39,638,970	36,547,952	29,385,735	27,664,731	28,424,860	29,235,659	28,418,678	24,928,502	26,048,298
Office Equipment	9,815,447	9,944,131	10,070,826	10,192,698	14,476,213	14,954,856	13,995,702	14,149,260	19,345,437	15,868,993	15,225,706	14,912,567
Refrigeration	2,278,714	12,142,237	16,003,869	16,121,129	16,665,258	12,106,188	10,809,190	14,507,948	13,338,508	15,168,412	11,410,876	10,897,421
HVAC	8,974,415	12,505,920	14,867,967	32,870,267	17,313,245	20,092,286	19,680,622	13,202,528	13,237,494	12,874,836	12,636,034	13,578,373
Compressed Air	2,187,722	2,824,492	3,241,253	3,672,534	3,752,964	3,356,728	3,355,684	3,554,809	3,759,773	3,818,881	3,686,241	3,742,232
Water Heating	103,897	461,987	465,992	469,844	409,043	272,077	231,322	235,277	200,336	198,980	261,771	264,531
Ventilation	1,207,235	1,687,028	9,326,256	12,195,220	10,421,986	8,787,173	8,106,317	4,721,828	2,232,955	2,179,779	3,772,797	9,141,205
Cooking	520,837	725,974	863,304	2,145,334	977,318	2,159,173	2,165,860	866,235	868,531	833,321	841,606	973,482
Pools	172,419	240,761	286,809	590,721	326,332	284,097	221,659	222,664	223,680	184,936	425,840	427,048
Other	437,906	609,505	723,788	834,516	807,047	672,525	625,042	617,793	618,858	586,200	504,312	524,928
Machine Drive	787,289	5,009,265	5,131,154	5,254,400	5,379,446	5,588,212	5,718,014	5,850,404	1,178,540	1,986,716	6,353,998	6,502,159
Process Cooling & Heating	1,397,063	1,744,166	1,755,435	1,766,275	1,776,839	1,787,327	1,797,499	1,807,639	1,817,892	1,828,355	1,840,291	1,851,207
Agriculture	73,344	73,805	74,259	74,695	75,120	75,543	75,952	76,360	76,773	77,194	105,013	105,526
Overall Program (Res + C&I)	**$115,351,595**	**$126,710,983**	**$152,388,323**	**$187,025,175**	**$169,760,525**	**$169,869,676**	**$171,955,410**	**$163,735,983**	**$158,695,967**	**$164,552,542**	**$168,651,122**	**$164,537,246**
Pilots	6,629,402	7,282,240	8,757,950	10,748,573	9,756,352	9,762,625	9,882,495	9,410,114	9,120,458	9,457,043	9,692,593	9,456,164
Education	3,977,641	4,369,344	5,254,770	6,449,144	5,853,811	5,857,575	5,929,497	5,646,068	5,472,275	5,674,226	5,815,556	5,673,698
EM&V	6,629,402	7,282,240	8,757,950	10,748,573	9,756,352	9,762,625	9,882,495	9,410,114	9,120,458	9,457,043	9,692,593	9,456,164
Performance Incentive	26,517,608	29,128,962	35,031,798	42,994,293	39,025,408	39,050,500	39,529,979	37,640,456	36,481,832	37,828,171	38,770,373	37,824,654
Total Spend	**$159,105,648**	**$174,773,770**	**$210,190,791**	**$257,965,759**	**$234,152,449**	**$234,303,001**	**$237,179,876**	**$225,842,735**	**$218,890,989**	**$226,969,023**	**$232,622,237**	**$226,947,926**

DTE Electric Company

WP KLB-16 EWR Model 2.25% Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
232,178	**236,490**	**236,268**	**213,734**	**206,918**	**219,340**	**242,125**	**230,965**	**230,739**	**230,722**
8,340	7,670	7,000	21,192	21,230	21,041	20,272	20,481	20,481	20,481
29,387	30,358	29,506	21,373	20,692	21,934	24,213	23,096	23,074	23,072
107,175	109,646	111,358	109,736	113,267	120,754	137,110	117,596	117,596	117,596
32,134	32,650	32,291	10,671	2,586	3,517	3,027	14,937	14,788	14,776
2,322	2,365	2,363	2,137	2,069	2,193	2,421	2,310	2,307	2,307
17,413	17,737	17,720	16,030	15,519	16,451	18,159	17,322	17,305	17,304
580	591	591	534	517	548	605	577	577	577
34,827	35,474	35,440	32,060	31,038	32,901	36,319	34,645	34,611	34,608
682,115	**676,663**	**674,950**	**698,437**	**705,391**	**692,760**	**670,662**	**680,525**	**679,860**	**679,809**
207,243	208,066	211,898	216,292	211,010	179,803	187,227	187,227	187,227	187,227
229,445	205,265	164,777	191,937	230,105	205,925	183,581	165,452	165,452	165,452
80,668	43,056	76,778	33,874	34,211	33,599	32,527	52,479	51,904	51,860
54,569	54,133	53,996	55,875	56,431	55,421	53,653	54,442	54,389	54,385
61,744	64,767	64,933	73,861	73,689	73,377	72,692	70,832	70,832	70,832
3,442	3,442	2,970	1,746	1,763	1,732	1,677	1,701	1,700	1,700
13,642	13,533	13,499	13,969	14,108	13,855	13,413	13,610	13,597	13,596
3,411	3,383	3,375	3,492	3,527	3,464	3,353	3,403	3,399	3,399
1,705	1,692	1,687	1,746	1,763	1,436	1,222	1,138	1,138	1,138
1,705	1,692	1,687	1,746	1,763	1,732	1,677	1,701	1,700	1,700
11,937	65,030	66,745	85,512	58,459	104,172	101,947	110,600	110,600	110,600
12,038	12,038	12,038	17,461	17,635	17,319	16,767	17,013	16,996	16,995
566	566	566	926	926	926	926	926	926	926
914,293	**913,153**	**911,219**	**912,172**	**912,309**	**912,101**	**912,787**	**911,489**	**910,599**	**910,531**
49,562	49,497	49,398	49,433	49,466	49,427	49,492	49,492	49,433	49,457
29,737	29,698	29,639	29,660	29,680	29,656	29,695	29,695	29,660	29,674
993,593	**992,349**	**990,255**	**991,264**	**991,455**	**991,184**	**991,974**	**990,677**	**989,692**	**989,663**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$56,301,993	**$58,359,004**	**$59,371,260**	**$51,758,009**	**$51,860,513**	**$56,469,846**	**$70,476,557**	**$58,957,194**	**$59,481,709**	**$60,085,243**
2,834,632	2,667,345	2,504,064	5,155,659	5,077,106	4,955,384	4,730,028	4,678,920	4,731,895	4,785,963
10,727,822	11,317,717	11,307,467	8,410,654	8,413,997	9,171,172	10,381,178	10,157,863	10,207,619	10,267,767
20,595,459	21,373,109	22,303,451	22,884,313	25,895,214	28,745,198	40,492,667	25,816,007	26,120,172	26,430,614
9,642,886	10,056,521	10,095,722	3,404,580	832,460	1,140,528	987,871	4,925,748	4,914,695	4,949,919
1,116,550	1,132,335	1,132,491	1,023,190	985,181	1,035,947	1,154,707	1,104,002	1,108,891	1,114,899
6,488,618	6,734,777	6,865,599	6,128,199	5,976,900	6,376,870	7,066,685	6,780,345	6,818,481	6,863,655
300,032	306,931	307,995	279,869	272,177	289,852	321,465	308,111	309,302	310,801
4,595,994	4,770,269	4,854,472	4,471,546	4,407,479	4,754,895	5,341,955	5,186,199	5,270,654	5,361,624
$110,977,700	**$112,018,934**	**$113,326,575**	**$118,928,523**	**$120,225,807**	**$115,438,455**	**$114,612,621**	**$118,642,098**	**$119,407,718**	**$120,155,895**
55,037,874	55,465,604	56,439,938	57,929,141	56,980,528	49,567,070	52,176,209	52,376,049	52,579,969	52,788,097
20,289,946	17,777,582	14,297,885	16,224,839	21,286,401	18,696,821	16,277,153	15,252,729	15,432,932	15,616,855
8,452,485	4,833,187	9,912,151	4,556,447	4,104,450	4,087,397	4,138,761	6,606,759	6,590,884	6,642,972
15,505,377	15,683,354	14,033,162	17,158,140	17,612,555	17,825,232	17,414,992	18,814,853	18,978,828	19,037,871
3,799,387	4,807,816	4,975,738	5,691,777	5,729,620	5,669,970	5,448,638	5,284,220	5,361,368	5,440,108
267,717	270,970	250,132	267,904	290,495	287,069	279,665	288,753	290,322	292,190
2,557,737	2,551,395	2,610,130	2,656,015	2,739,619	2,708,734	2,638,569	2,725,676	2,737,822	2,752,732
952,109	947,697	948,551	984,995	998,345	984,018	956,135	973,828	976,579	980,285
324,039	323,048	308,855	278,349	279,403	267,590	246,237	219,857	221,097	222,361
569,908	566,952	567,144	650,954	659,206	649,177	630,222	626,461	627,701	629,543
1,252,718	6,811,014	6,990,421	9,621,402	6,590,582	11,772,173	11,552,548	12,572,368	12,692,829	12,815,777
1,862,351	1,873,728	1,885,334	2,752,660	2,797,777	2,765,427	2,694,747	2,740,810	2,756,644	2,775,331
106,051	106,586	107,132	155,897	156,827	157,776	158,745	159,734	160,743	161,773
$167,279,692	**$170,377,938**	**$172,697,834**	**$170,686,532**	**$172,086,320**	**$171,908,301**	**$185,089,177**	**$177,599,292**	**$178,889,427**	**$180,241,138**
9,613,775	9,791,836	9,925,163	9,809,571	9,890,018	9,879,787	10,637,309	10,206,856	10,281,002	10,358,686
5,768,265	5,875,101	5,955,098	5,885,742	5,934,011	5,927,872	6,382,385	6,124,114	6,168,601	6,215,212
9,613,775	9,791,836	9,925,163	9,809,571	9,890,018	9,879,787	10,637,309	10,206,856	10,281,002	10,358,686
38,455,102	39,167,342	39,700,652	39,238,283	39,560,074	39,519,150	42,549,236	40,827,423	41,124,006	41,434,744
$230,730,610	**$235,004,052**	**$238,203,909**	**$235,429,699**	**$237,360,442**	**$237,114,898**	**$255,295,417**	**$244,964,541**	**$246,744,037**	**$248,608,467**

DTE Electric Company

WP KLB-17 EWR Model 2.25%_Flat Costs High: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**221,497**	**227,059**	**235,306**	**268,370**	**298,527**	**301,425**	**296,467**	**318,996**	**312,074**	**286,671**
Lighting	117,831	98,338	58,514	17,874	18,666	19,539	20,540	21,761	22,963	10,235	9,044	8,487
Appliances	27,141	21,340	40,147	42,226	44,506	46,872	49,390	52,188	54,927	57,564	32,541	38,021
Electronics	29,504	33,967	47,418	54,073	62,644	70,629	82,855	92,724	111,095	118,868	163,371	104,872
Water Heating	8,250	2,667	14,802	17,441	20,099	22,719	25,396	28,314	31,094	33,235	33,000	32,571
HVAC Shell	2,586	2,134	2,215	22,114	8,234	15,825	16,283	3,014	2,965	3,190	3,121	2,867
HVAC Equipment	18,392	16,005	24,623	38,704	45,273	51,861	58,536	57,456	28,211	47,258	23,406	56,136
Miscellaneous	628	533	554	568	588	671	746	754	741	797	780	717
Cross-Cutting	54,316	38,411	33,225	34,059	35,296	40,256	44,779	45,214	44,470	47,849	46,811	43,001
Commerical & Industrial	**387,974**	**538,871**	**638,588**	**734,821**	**718,198**	**677,348**	**639,409**	**630,634**	**630,350**	**602,893**	**606,932**	**630,024**
Lighting	151,964	151,964	153,302	153,302	140,454	109,247	103,686	106,180	109,517	107,027	90,964	93,946
Office Equipment	135,243	135,243	135,243	135,243	168,691	196,732	182,188	182,188	228,712	186,448	191,276	182,921
Refrigeration	18,817	99,484	130,125	130,125	160,505	119,990	108,019	131,304	135,914	147,121	111,916	108,035
HVAC	31,038	43,110	51,087	112,594	57,456	68,956	65,904	50,451	50,428	48,231	48,555	50,402
Compressed Air	21,330	32,327	41,023	49,718	54,773	54,208	55,899	59,015	62,131	63,791	61,744	61,744
Water Heating	970	4,275	4,275	4,275	3,634	2,273	1,856	1,863	1,576	1,507	3,447	3,442
Ventilation	7,759	10,777	59,225	77,004	64,340	51,114	45,855	26,788	12,607	12,058	20,374	49,084
Cooking	1,940	2,694	3,193	7,908	3,591	7,908	7,908	3,153	3,152	3,014	3,035	3,150
Pools	970	1,347	1,596	3,272	1,795	1,543	1,192	1,192	1,192	976	1,332	1,332
Other	970	1,347	1,596	1,837	1,795	1,693	1,599	1,577	1,576	1,507	1,517	1,575
Machine Drive	6,790	43,789	45,409	47,029	48,649	51,169	52,789	54,409	11,031	18,698	60,170	61,790
Process Cooling & Heating	9,699	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,038	12,038
Agriculture	484	484	484	484	484	484	484	484	484	484	566	566
Overall Program (Res + C&I)	**646,623**	**752,267**	**860,085**	**961,879**	**953,504**	**945,718**	**937,936**	**932,059**	**926,817**	**921,890**	**919,006**	**916,695**
Pilots	35,143	40,884	46,744	52,276	51,821	51,397	50,972	50,649	50,355	50,066	49,871	49,714
Education	21,086	24,530	28,046	31,366	31,092	30,838	30,583	30,389	30,213	30,040	29,923	29,828
Total Savings	**702,851**	**817,681**	**934,875**	**1,045,521**	**1,036,417**	**1,027,953**	**1,019,491**	**1,013,098**	**1,007,384**	**1,001,996**	**998,800**	**996,238**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$48,252,267**	**$48,472,247**	**$63,136,508**	**$78,605,856**	**$77,551,168**	**$89,593,286**	**$98,339,796**	**$95,090,343**	**$90,847,660**	**$100,971,290**	**$109,752,129**	**$94,788,158**
Lighting	19,627,098	18,602,737	15,261,485	9,437,299	9,324,975	9,210,625	9,101,823	9,032,902	8,918,496	4,670,450	4,072,086	3,711,691
Appliances	7,825,626	8,051,056	15,145,743	15,775,864	16,542,037	17,372,231	18,306,151	19,426,117	20,520,286	21,466,177	14,706,936	17,627,280
Electronics	5,538,286	7,934,284	11,174,805	12,933,320	15,024,227	17,108,526	19,822,736	22,304,109	29,020,242	32,027,046	58,803,268	26,110,634
Water Heating	2,221,404	931,455	5,192,107	6,134,012	7,111,764	8,105,022	9,153,893	10,336,703	11,503,230	12,451,193	12,337,592	12,290,712
HVAC Shell	1,103,846	1,226,238	1,278,096	12,796,458	4,787,834	9,258,095	9,597,418	1,793,003	1,780,530	1,932,780	1,924,705	1,799,416
HVAC Equipment	6,047,545	7,010,547	10,861,178	17,123,364	20,105,598	23,126,137	26,222,794	25,883,939	12,776,625	21,482,143	10,987,197	26,775,110
Miscellaneous	308,925	356,621	371,392	381,932	397,032	454,210	506,748	513,177	506,235	546,353	536,146	494,048
Cross-Cutting	5,579,536	4,359,308	3,851,702	4,023,606	4,257,702	4,958,440	5,628,232	5,800,393	5,822,015	6,395,148	6,384,199	5,979,266
Commerical & Industrial	**$67,099,328**	**$116,262,143**	**$135,960,014**	**$167,731,851**	**$143,593,710**	**$130,585,898**	**$123,754,191**	**$114,808,290**	**$111,578,574**	**$108,840,405**	**$105,630,510**	**$114,913,729**
Lighting	39,143,040	53,759,015	53,981,198	54,119,343	49,860,906	40,110,593	37,709,582	38,713,547	39,772,319	38,610,621	33,888,232	35,394,920
Office Equipment	9,815,447	12,100,087	12,226,781	12,348,653	17,857,322	17,998,323	16,810,906	16,964,464	23,474,419	19,207,660	18,126,027	17,765,937
Refrigeration	2,278,714	15,797,020	20,784,302	20,901,562	21,121,508	15,241,730	13,554,522	18,384,236	16,581,754	18,937,118	14,180,275	13,478,326
HVAC	8,974,415	17,194,354	20,423,984	45,115,668	23,771,702	27,523,544	26,963,777	17,961,120	17,993,056	17,496,966	17,131,291	18,422,891
Compressed Air	2,187,722	3,531,640	3,975,145	4,433,169	4,444,768	3,867,918	3,817,231	4,025,939	4,240,486	4,270,948	4,095,920	4,151,911
Water Heating	103,897	593,418	597,423	601,275	523,539	349,803	298,040	302,886	257,518	256,268	308,625	311,333
Ventilation	1,207,235	2,242,229	12,377,266	16,162,087	13,811,842	11,678,633	10,779,335	6,267,791	2,960,523	2,890,056	5,003,599	12,109,561
Cooking	520,837	995,152	1,182,294	2,935,398	1,336,075	2,949,237	2,955,924	1,181,251	1,183,406	1,134,480	1,144,782	1,329,764
Pools	172,419	322,968	384,228	790,367	436,142	379,454	295,832	296,836	297,852	246,072	583,104	584,311
Other	437,906	849,745	1,008,484	1,162,114	1,122,877	931,779	864,990	854,448	855,407	809,440	691,690	719,435
Machine Drive	787,289	6,474,265	6,604,935	6,736,964	6,870,792	7,107,737	7,246,321	7,387,494	1,482,892	2,490,948	7,936,831	8,093,774
Process Cooling & Heating	1,397,063	2,304,355	2,315,625	2,326,465	2,337,028	2,347,516	2,357,689	2,367,828	2,378,081	2,388,544	2,400,851	2,411,767
Agriculture	73,344	97,894	98,348	98,784	99,210	99,632	100,041	100,450	100,862	101,284	139,283	139,797
Overall Program (Res + C&I)	**$115,351,595**	**$164,734,389**	**$199,096,522**	**$246,337,707**	**$221,144,878**	**$220,179,185**	**$222,093,986**	**$209,898,633**	**$202,426,234**	**$209,811,695**	**$215,382,640**	**$209,701,887**
Pilots	6,629,402	9,467,494	11,442,329	14,157,339	12,709,476	12,653,976	12,764,022	12,063,140	11,633,692	12,058,143	12,378,313	12,051,833
Education	3,977,641	5,680,496	6,865,397	8,494,404	7,625,685	7,592,386	7,658,413	7,237,884	6,980,215	7,234,886	7,426,988	7,231,100
EM&V	6,629,402	9,467,494	11,442,329	14,157,339	12,709,476	12,653,976	12,764,022	12,063,140	11,633,692	12,058,143	12,378,313	12,051,833
Performance Incentive	26,517,608	37,869,975	45,769,315	56,629,358	50,837,903	50,615,905	51,056,089	48,252,559	46,534,766	48,232,573	49,513,251	48,207,330
Total Spend	**$159,105,648**	**$227,219,847**	**$274,615,892**	**$339,776,147**	**$305,027,418**	**$303,695,427**	**$306,336,533**	**$289,515,356**	**$279,208,599**	**$289,395,441**	**$297,079,503**	**$289,243,982**

DTE Electric Company

WP KLB-17 EWR Model 2.25%_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
232,178	**236,490**	**236,268**	**213,734**	**206,918**	**219,340**	**242,125**	**230,965**	**230,739**	**230,722**
8,340	7,670	7,000	21,192	21,230	21,041	20,272	20,481	20,481	20,481
29,387	30,358	29,506	21,373	20,692	21,934	24,213	23,096	23,074	23,072
107,175	109,646	111,358	109,736	113,267	120,754	137,110	117,596	117,596	117,596
32,134	32,650	32,291	10,671	2,586	3,517	3,027	14,937	14,788	14,776
2,322	2,365	2,363	2,137	2,069	2,193	2,421	2,310	2,307	2,307
17,413	17,737	17,720	16,030	15,519	16,451	18,159	17,322	17,305	17,304
580	591	591	534	517	548	605	577	577	577
34,827	35,474	35,440	32,060	31,038	32,901	36,319	34,645	34,611	34,608
682,115	**676,663**	**674,950**	**698,437**	**705,391**	**692,760**	**670,662**	**680,525**	**679,860**	**679,809**
207,243	208,066	211,898	216,292	211,010	179,803	187,227	187,227	187,227	187,227
229,445	205,265	164,777	191,937	230,105	205,925	183,581	165,452	165,452	165,452
80,668	43,056	76,778	33,874	34,211	33,599	32,527	52,479	51,904	51,860
54,569	54,133	53,996	55,875	56,431	55,421	53,653	54,442	54,389	54,385
61,744	64,767	64,933	73,861	73,689	73,377	72,692	70,832	70,832	70,832
3,442	3,442	2,970	1,746	1,763	1,732	1,677	1,701	1,700	1,700
13,642	13,533	13,499	13,969	14,108	13,855	13,413	13,610	13,597	13,596
3,411	3,383	3,375	3,492	3,527	3,464	3,353	3,403	3,399	3,399
1,705	1,692	1,687	1,746	1,763	1,436	1,222	1,138	1,138	1,138
1,705	1,692	1,687	1,746	1,763	1,732	1,677	1,701	1,700	1,700
11,937	65,030	66,745	85,512	58,459	104,172	101,947	110,600	110,600	110,600
12,038	12,038	12,038	17,461	17,635	17,319	16,767	17,013	16,996	16,995
566	566	566	926	926	926	926	926	926	926
914,293	**913,153**	**911,219**	**912,172**	**912,309**	**912,101**	**912,787**	**911,489**	**910,599**	**910,531**
49,562	49,497	49,398	49,433	49,466	49,427	49,492	49,492	49,433	49,457
29,737	29,698	29,639	29,660	29,680	29,656	29,695	29,695	29,660	29,674
993,593	**992,349**	**990,255**	**991,264**	**991,455**	**991,184**	**991,974**	**990,677**	**989,692**	**989,663**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$69,548,967	**$72,057,969**	**$73,282,822**	**$63,292,692**	**$63,567,203**	**$69,291,674**	**$87,861,408**	**$71,745,184**	**$72,250,907**	**$72,853,010**
3,658,581	3,443,590	3,235,534	6,309,557	6,173,736	5,987,471	5,683,890	5,577,543	5,630,518	5,684,586
13,948,060	14,716,057	14,713,205	10,950,487	10,968,071	11,963,721	13,548,316	13,263,294	13,310,017	13,369,934
24,398,673	25,288,336	26,426,232	27,225,291	31,234,926	34,799,737	50,587,358	30,526,122	30,830,286	31,140,728
12,269,387	12,804,721	12,846,207	4,332,091	1,057,737	1,446,865	1,251,002	6,229,710	6,205,607	6,239,837
1,486,247	1,504,501	1,502,511	1,355,227	1,302,209	1,366,129	1,521,387	1,452,352	1,456,901	1,462,883
8,453,270	8,772,707	8,943,003	7,956,021	7,749,485	8,256,349	9,133,811	8,750,254	8,786,465	8,831,492
401,411	410,193	411,160	373,194	362,526	385,625	427,188	408,960	410,052	411,544
4,933,339	5,117,864	5,204,970	4,790,824	4,718,512	5,085,777	5,708,456	5,536,949	5,621,061	5,712,005
$145,076,693	**$146,397,689**	**$148,021,358**	**$155,246,828**	**$156,650,625**	**$149,777,692**	**$148,780,098**	**$154,005,299**	**$154,796,823**	**$155,542,951**
74,535,195	75,045,711	76,272,869	78,218,784	76,883,593	66,882,040	70,363,278	70,563,119	70,767,039	70,975,167
24,457,093	21,262,097	17,038,520	19,152,095	25,483,224	22,211,013	19,160,199	18,025,224	18,205,428	18,389,351
10,482,836	6,037,313	12,582,022	5,798,634	5,131,124	5,105,120	5,187,333	8,244,217	8,210,396	8,261,118
21,073,508	21,314,443	18,937,474	23,339,544	23,952,750	24,253,866	23,682,383	25,639,689	25,849,761	25,908,292
4,209,066	5,563,763	5,773,485	6,581,740	6,607,698	6,496,923	6,163,113	5,937,304	6,014,451	6,093,191
314,519	317,772	296,291	346,093	377,242	372,262	362,141	373,796	375,282	377,144
3,384,652	3,372,263	3,451,283	3,501,287	3,611,731	3,566,932	3,470,340	3,584,154	3,595,462	3,610,308
1,292,841	1,285,706	1,285,705	1,333,881	1,350,704	1,330,067	1,291,146	1,313,766	1,316,185	1,319,865
429,256	427,424	406,538	361,014	361,396	350,902	324,512	288,196	289,435	290,700
780,498	775,858	775,521	893,307	903,972	889,560	862,937	856,236	857,251	859,076
1,553,997	8,420,194	8,614,353	11,951,077	8,163,672	14,541,599	14,230,756	15,444,126	15,564,587	15,687,535
2,422,911	2,434,288	2,445,894	3,566,095	3,619,311	3,572,250	3,475,833	3,528,357	3,543,422	3,562,050
140,321	140,857	141,403	203,277	204,208	205,157	206,126	207,115	208,124	209,153
$214,625,660	**$218,455,658**	**$221,304,180**	**$218,539,519**	**$220,217,828**	**$219,069,366**	**$236,641,506**	**$225,750,483**	**$227,047,730**	**$228,395,961**
12,334,808	12,554,923	12,718,631	12,559,742	12,656,197	12,590,193	13,600,087	12,974,166	13,048,720	13,126,205
7,400,885	7,532,954	7,631,179	7,535,845	7,593,718	7,554,116	8,160,052	7,784,499	7,829,232	7,875,723
12,334,808	12,554,923	12,718,631	12,559,742	12,656,197	12,590,193	13,600,087	12,974,166	13,048,720	13,126,205
49,339,232	50,219,692	50,874,524	50,238,970	50,624,788	50,360,774	54,400,346	51,896,663	52,194,881	52,504,819
$296,035,393	**$301,318,150**	**$305,247,145**	**$301,433,820**	**$303,748,728**	**$302,164,643**	**$326,402,077**	**$311,379,977**	**$313,169,283**	**$315,028,912**

DTE Electric Company

WP KLB-18 EWR Model 2.25%_Tiered Costs: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**213,396**	**221,497**	**227,059**	**235,306**	**268,370**	**298,527**	**301,425**	**296,467**	**318,996**	**312,074**	**286,671**
Lighting	114,825	93,540	54,423	17,874	18,666	19,539	20,540	21,761	22,963	10,235	9,044	8,487
Appliances	33,138	25,736	36,095	42,226	44,506	46,872	49,390	52,188	54,927	57,564	32,541	38,021
Electronics	27,392	34,369	40,919	54,073	62,644	70,629	82,855	92,724	111,095	118,868	163,371	104,872
Water Heating	7,716	2,667	13,194	17,441	20,099	22,719	25,396	28,314	31,094	33,235	33,000	32,571
HVAC Shell	3,225	2,134	13,428	22,114	8,234	15,825	16,283	3,014	2,965	3,190	3,121	2,867
HVAC Equipment	17,476	16,005	29,437	38,704	45,273	51,861	58,536	57,456	28,211	47,258	23,406	56,136
Miscellaneous	560	533	777	568	588	671	746	754	741	797	780	717
Cross-Cutting	54,316	38,411	33,225	34,059	35,296	40,256	44,779	45,214	44,470	47,849	46,811	43,001
Commerical & Industrial	**387,974**	**538,871**	**638,588**	**734,821**	**718,198**	**677,348**	**639,409**	**630,634**	**630,350**	**602,893**	**606,932**	**630,024**
Lighting	133,750	133,750	134,883	153,302	140,454	109,247	103,686	106,180	109,517	107,027	90,964	93,946
Office Equipment	118,907	118,907	118,907	135,243	168,691	196,732	182,188	182,188	228,712	186,448	191,276	182,921
Refrigeration	18,817	117,561	117,561	130,125	160,505	119,990	108,019	131,304	135,914	147,121	111,916	108,035
HVAC	31,038	43,110	89,366	112,594	57,456	68,956	65,904	50,451	50,428	48,231	48,555	50,402
Compressed Air	20,043	28,581	36,191	49,718	54,773	54,208	55,899	59,015	62,131	63,791	61,744	61,744
Water Heating	3,645	3,645	3,645	4,275	3,634	2,273	1,856	1,863	1,576	1,507	3,447	3,442
Ventilation	7,759	36,326	67,333	77,004	64,340	51,114	45,855	26,788	12,607	12,058	20,374	49,084
Cooking	1,940	2,694	7,512	7,908	3,591	7,908	7,908	3,153	3,152	3,014	3,035	3,150
Pools	970	1,347	3,025	3,272	1,795	1,543	1,192	1,192	1,192	976	1,332	1,332
Other	970	1,347	7,093	1,837	1,795	1,693	1,599	1,577	1,576	1,507	1,517	1,575
Machine Drive	38,573	40,041	41,510	47,029	48,649	51,169	52,789	54,409	11,031	18,698	60,170	61,790
Process Cooling & Heating	11,092	11,092	11,092	12,030	12,030	12,030	12,030	12,030	12,030	12,030	12,038	12,038
Agriculture	469	469	469	484	484	484	484	484	484	484	566	566
Overall Program (Res + C&I)	**646,623**	**752,267**	**860,085**	**961,879**	**953,504**	**945,718**	**937,936**	**932,059**	**926,817**	**921,890**	**919,006**	**916,695**
Pilots	35,143	40,884	46,744	52,276	51,821	51,397	50,972	50,641	50,340	50,049	49,850	49,702
Education	21,086	24,530	28,046	31,366	31,092	30,838	30,583	30,385	30,204	30,030	29,910	29,821
Total Savings	**702,851**	**817,681**	**934,875**	**1,045,521**	**1,036,417**	**1,027,953**	**1,019,491**	**1,013,085**	**1,007,361**	**1,001,969**	**998,767**	**996,219**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$35,614,266**	**$53,228,757**	**$78,605,856**	**$77,551,168**	**$89,593,286**	**$98,339,796**	**$95,090,343**	**$90,847,660**	**$100,971,290**	**$109,752,129**	**$94,788,158**
Lighting	15,192,489	13,007,805	10,548,303	9,437,299	9,324,975	9,210,625	9,101,823	9,032,902	8,918,496	4,670,450	4,072,086	3,711,691
Appliances	7,176,137	6,393,100	10,087,983	15,775,864	16,542,037	17,372,231	18,306,151	19,426,117	20,520,286	21,466,177	14,706,936	17,627,280
Electronics	3,741,531	5,147,464	6,674,669	12,933,320	15,024,227	17,108,526	19,822,736	22,304,109	29,020,242	32,027,046	58,803,268	26,110,634
Water Heating	1,979,097	792,691	4,458,193	6,134,012	7,111,764	8,105,022	9,153,893	10,336,703	11,503,230	12,451,193	12,337,592	12,290,712
HVAC Shell	1,153,480	885,433	6,360,970	12,796,458	4,787,834	9,258,095	9,597,418	1,793,003	1,780,530	1,932,780	1,924,705	1,799,416
HVAC Equipment	5,124,891	5,452,302	11,409,275	17,123,364	20,105,598	23,126,137	26,222,794	25,883,939	12,776,625	21,482,143	10,987,197	26,775,110
Miscellaneous	161,295	178,031	294,781	381,932	397,032	454,210	506,748	513,177	506,235	546,353	536,146	494,048
Cross-Cutting	5,071,274	3,757,440	3,394,583	4,023,606	4,257,702	4,958,440	5,628,232	5,800,393	5,822,015	6,395,148	6,384,199	5,979,266
Commerical & Industrial	**$58,998,406**	**$92,905,598**	**$137,413,090**	**$167,731,851**	**$143,593,710**	**$130,585,898**	**$123,754,191**	**$114,808,290**	**$111,578,574**	**$108,840,405**	**$105,630,510**	**$114,913,729**
Lighting	30,093,471	35,655,319	41,278,213	54,119,343	49,860,906	40,110,593	37,709,582	38,713,547	39,772,319	38,610,621	33,888,232	35,394,920
Office Equipment	8,632,730	9,694,255	10,754,030	12,348,653	17,857,322	17,998,323	16,810,906	16,964,464	23,474,419	19,207,660	18,126,027	17,765,937
Refrigeration	2,290,235	16,595,392	18,880,385	20,901,562	21,121,508	15,241,730	13,554,522	18,384,236	16,581,754	18,937,118	14,180,275	13,478,326
HVAC	9,320,249	15,433,409	37,149,789	45,115,668	23,771,702	27,523,544	26,963,777	17,961,120	17,993,056	17,496,966	17,131,291	18,422,891
Compressed Air	2,139,099	2,921,454	3,642,154	4,433,169	4,444,768	3,867,918	3,817,231	4,025,939	4,240,486	4,270,948	4,095,920	4,151,911
Water Heating	376,110	432,539	488,914	601,275	523,539	349,803	298,040	302,886	257,518	256,268	308,625	311,333
Ventilation	1,055,856	5,761,365	12,195,111	16,162,087	13,811,842	11,678,633	10,779,335	6,267,791	2,960,523	2,890,056	5,003,599	12,109,561
Cooking	529,885	875,823	2,831,681	2,935,398	1,336,075	2,949,237	2,955,924	1,181,251	1,183,406	1,134,480	1,144,782	1,329,764
Pools	179,302	293,472	758,820	790,367	436,142	379,454	295,832	296,836	297,852	246,072	583,104	584,311
Other	421,161	701,384	4,305,937	1,162,114	1,122,877	931,779	864,990	854,448	855,407	809,440	691,690	719,435
Machine Drive	2,915,557	3,349,209	3,789,025	6,736,964	6,870,792	7,107,737	7,246,321	7,387,494	1,482,892	2,490,948	7,936,831	8,093,774
Process Cooling & Heating	1,000,425	1,141,261	1,281,934	2,326,465	2,337,028	2,347,516	2,357,689	2,367,828	2,378,081	2,388,544	2,400,851	2,411,767
Agriculture	44,326	50,715	57,097	98,784	99,210	99,632	100,041	100,450	100,862	101,284	139,283	139,797
Overall Program (Res + C&I)	**$98,598,600**	**$128,519,864**	**$190,641,847**	**$246,337,707**	**$221,144,878**	**$220,179,185**	**$222,093,986**	**$209,898,633**	**$202,426,234**	**$209,811,695**	**$215,382,640**	**$209,701,887**
Pilots	5,666,586	7,386,199	10,956,428	14,157,339	12,709,476	12,653,976	12,764,022	12,063,140	11,633,692	12,058,143	12,378,313	12,051,833
Education	3,399,952	4,431,719	6,573,857	8,494,404	7,625,685	7,592,386	7,658,413	7,237,884	6,980,215	7,234,886	7,426,988	7,231,100
EM&V	5,666,586	7,386,199	10,956,428	14,157,339	12,709,476	12,653,976	12,764,022	12,063,140	11,633,692	12,058,143	12,378,313	12,051,833
Performance Incentive	22,666,345	29,544,796	43,825,712	56,629,358	50,837,903	50,615,905	51,056,089	48,252,559	46,534,766	48,232,573	49,513,251	48,207,330
Total Spend	**$135,998,068**	**$177,268,778**	**$262,954,272**	**$339,776,147**	**$305,027,418**	**$303,695,427**	**$306,336,533**	**$289,515,356**	**$279,208,599**	**$289,395,441**	**$297,079,503**	**$289,243,982**

DTE Electric Company

WP KLB-18 EWR Model 2.25%_Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
232,178	**236,490**	**236,268**	**213,734**	**206,918**	**219,340**	**242,125**	**230,965**	**230,739**	**230,722**
8,340	7,670	7,000	21,192	21,230	21,041	20,272	20,481	20,481	20,481
29,387	30,358	29,506	21,373	20,692	21,934	24,213	23,096	23,074	23,072
107,175	109,646	111,358	109,736	113,267	120,754	137,110	117,596	117,596	117,596
32,134	32,650	32,291	10,671	2,586	3,517	3,027	14,937	14,788	14,776
2,322	2,365	2,363	2,137	2,069	2,193	2,421	2,310	2,307	2,307
17,413	17,737	17,720	16,030	15,519	16,451	18,159	17,322	17,305	17,304
580	591	591	534	517	548	605	577	577	577
34,827	35,474	35,440	32,060	31,038	32,901	36,319	34,645	34,611	34,608
682,115	**676,663**	**674,950**	**698,437**	**705,391**	**692,760**	**670,662**	**680,525**	**679,860**	**679,809**
207,243	208,066	211,898	216,292	211,010	179,803	187,227	187,227	187,227	187,227
229,445	205,265	164,777	191,937	230,105	205,925	183,581	165,452	165,452	165,452
80,668	43,056	76,778	33,874	34,211	33,599	32,527	52,479	51,904	51,860
54,569	54,133	53,996	55,875	56,431	55,421	53,653	54,442	54,389	54,385
61,744	64,767	64,933	73,861	73,689	73,377	72,692	70,832	70,832	70,832
3,442	3,442	2,970	1,746	1,763	1,732	1,677	1,701	1,700	1,700
13,642	13,533	13,499	13,969	14,108	13,855	13,413	13,610	13,597	13,596
3,411	3,383	3,375	3,492	3,527	3,464	3,353	3,403	3,399	3,399
1,705	1,692	1,687	1,746	1,763	1,436	1,222	1,138	1,138	1,138
1,705	1,692	1,687	1,746	1,763	1,732	1,677	1,701	1,700	1,700
11,937	65,030	66,745	85,512	58,459	104,172	101,947	110,600	110,600	110,600
12,038	12,038	12,038	17,461	17,635	17,319	16,767	17,013	16,996	16,995
566	566	566	926	926	926	926	926	926	926
914,293	**913,153**	**911,219**	**912,172**	**912,309**	**912,101**	**912,787**	**911,489**	**910,599**	**910,531**
49,547	49,481	49,380	49,400	49,431	49,402	49,470	49,470	49,412	49,436
29,728	29,688	29,628	29,640	29,659	29,641	29,682	29,682	29,647	29,661
993,569	**992,323**	**990,227**	**991,211**	**991,399**	**991,144**	**991,939**	**990,642**	**989,657**	**989,628**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$69,548,967	**$72,057,969**	**$73,282,822**	**$63,292,692**	**$63,567,203**	**$69,291,674**	**$87,861,408**	**$71,745,184**	**$72,250,907**	**$72,853,010**
3,658,581	3,443,590	3,235,534	6,309,557	6,173,736	5,987,471	5,683,890	5,577,543	5,630,518	5,684,586
13,948,060	14,716,057	14,713,205	10,950,487	10,968,071	11,963,721	13,548,316	13,263,294	13,310,017	13,369,934
24,398,673	25,288,336	26,426,232	27,225,291	31,234,926	34,799,737	50,587,358	30,526,122	30,830,286	31,140,728
12,269,387	12,804,721	12,846,207	4,332,091	1,057,737	1,446,865	1,251,002	6,229,710	6,205,607	6,239,837
1,486,247	1,504,501	1,502,511	1,355,227	1,302,209	1,366,129	1,521,387	1,452,352	1,456,901	1,462,883
8,453,270	8,772,707	8,943,003	7,956,021	7,749,485	8,256,349	9,133,811	8,750,254	8,786,465	8,831,492
401,411	410,193	411,160	373,194	362,526	385,625	427,188	408,960	410,052	411,544
4,933,339	5,117,864	5,204,970	4,790,824	4,718,512	5,085,777	5,708,456	5,536,949	5,621,061	5,712,005
$145,076,693	**$146,397,689**	**$148,021,358**	**$155,246,828**	**$156,650,625**	**$149,777,692**	**$148,780,098**	**$154,005,299**	**$154,796,823**	**$155,542,951**
74,535,195	75,045,711	76,272,869	78,218,784	76,883,593	66,882,040	70,363,278	70,563,119	70,767,039	70,975,167
24,457,093	21,262,097	17,038,520	19,152,095	25,483,224	22,211,013	19,160,199	18,025,224	18,205,428	18,389,351
10,482,836	6,037,313	12,582,022	5,798,634	5,131,124	5,105,120	5,187,333	8,244,217	8,210,396	8,261,118
21,073,508	21,314,443	18,937,474	23,339,544	23,952,750	24,253,866	23,682,383	25,639,689	25,849,761	25,908,292
4,209,066	5,563,763	5,773,485	6,581,740	6,607,698	6,496,923	6,163,113	5,937,304	6,014,451	6,093,191
314,519	317,772	296,291	346,093	377,242	372,262	362,141	373,796	375,282	377,144
3,384,652	3,372,263	3,451,283	3,501,287	3,611,731	3,566,932	3,470,340	3,584,154	3,595,462	3,610,308
1,292,841	1,285,706	1,285,705	1,333,881	1,350,704	1,330,067	1,291,146	1,313,766	1,316,185	1,319,865
429,256	427,424	406,538	361,014	361,396	350,902	324,512	288,196	289,435	290,700
780,498	775,858	775,521	893,307	903,972	889,560	862,937	856,236	857,251	859,076
1,553,997	8,420,194	8,614,353	11,951,077	8,163,672	14,541,599	14,230,756	15,444,126	15,564,587	15,687,535
2,422,911	2,434,288	2,445,894	3,566,095	3,619,311	3,572,250	3,475,833	3,528,357	3,543,422	3,562,050
140,321	140,857	141,403	203,277	204,208	205,157	206,126	207,115	208,124	209,153
$214,625,660	**$218,455,658**	**$221,304,180**	**$218,539,519**	**$220,217,828**	**$219,069,366**	**$236,641,506**	**$225,750,483**	**$227,047,730**	**$228,395,961**
12,334,808	12,554,923	12,718,631	12,559,742	12,656,197	12,590,193	13,600,087	12,974,166	13,048,720	13,126,205
7,400,885	7,532,954	7,631,179	7,535,845	7,593,718	7,554,116	8,160,052	7,784,499	7,829,232	7,875,723
12,334,808	12,554,923	12,718,631	12,559,742	12,656,197	12,590,193	13,600,087	12,974,166	13,048,720	13,126,205
49,339,232	50,219,692	50,874,524	50,238,970	50,624,788	50,360,774	54,400,346	51,896,663	52,194,881	52,504,819
$296,035,393	**$301,318,150**	**$305,247,145**	**$301,433,820**	**$303,748,728**	**$302,164,643**	**$326,402,077**	**$311,379,977**	**$313,169,283**	**$315,028,912**

DTE Electric Company

WP KLB-19 EWR Model 2.50% Flat Costs Low: Output

Case No: U-20471
Workpaper: KLB-19
Page: 1 of 2
Witness: K. L. Bilyeu

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**223,151**	**240,324**	**251,653**	**260,171**	**296,021**	**328,505**	**331,073**	**325,058**	**349,179**	**341,281**	**313,265**
Lighting	142,257	119,956	71,076	23,269	23,811	24,451	25,242	26,282	27,282	11,251	10,347	10,105
Appliances	25,865	22,315	46,637	48,152	49,918	51,791	53,840	56,196	58,482	60,649	38,014	37,364
Electronics	10,346	18,398	52,187	58,395	66,719	74,409	86,521	96,128	115,363	122,695	165,606	106,566
Water Heating	3,233	2,789	13,347	24,537	28,431	32,239	36,104	40,300	44,254	47,202	46,260	45,786
HVAC Shell	2,586	2,232	2,403	2,517	2,602	2,960	3,285	3,311	3,251	3,492	3,413	3,133
HVAC Equipment	19,399	16,736	18,024	55,616	48,061	63,974	72,245	56,980	25,234	48,900	25,596	60,506
Miscellaneous	647	558	601	1,419	1,604	1,793	1,992	2,215	2,434	2,614	853	2,815
Cross-Cutting	54,316	40,167	36,049	37,748	39,026	44,403	49,276	49,661	48,759	52,377	51,192	46,990
Commerical & Industrial	**387,974**	**563,505**	**692,868**	**814,414**	**794,092**	**747,136**	**703,620**	**692,662**	**691,141**	**659,938**	**663,734**	**688,470**
Lighting	182,981	182,981	184,522	184,522	169,020	131,527	124,761	128,012	132,201	129,210	109,761	113,074
Office Equipment	74,639	165,429	165,429	165,429	206,364	240,455	222,665	222,665	279,589	227,912	233,827	223,626
Refrigeration	18,817	27,330	109,857	158,546	162,230	138,287	125,184	106,716	38,825	65,001	89,823	117,113
HVAC	31,038	45,080	55,429	65,153	63,527	59,771	56,290	55,413	55,291	52,795	53,099	55,078
Compressed Air	11,639	24,131	50,461	61,070	67,179	66,370	68,396	72,198	75,999	78,001	75,488	75,488
Water Heating	970	1,409	4,847	4,847	4,121	2,580	2,108	2,123	2,123	1,823	3,917	3,911
Ventilation	7,759	11,270	13,857	63,850	15,882	14,943	14,072	13,853	13,823	13,199	13,275	13,769
Cooking	1,940	2,818	3,464	4,072	3,970	3,736	3,518	3,463	3,456	3,300	3,319	3,442
Pools	40,220	40,220	40,220	40,220	33,523	18,791	14,438	14,438	14,438	11,759	1,659	1,721
Other	970	1,409	1,732	2,036	1,985	1,868	1,759	1,732	1,728	1,650	1,659	1,721
Machine Drive	6,790	48,406	50,026	51,646	53,266	55,786	57,406	59,026	60,646	62,266	64,786	66,406
Process Cooling & Heating	9,699	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,519	12,519
Agriculture	512	512	512	512	512	512	512	512	512	512	603	603
Overall Program (Res + C&I)	**646,623**	**786,656**	**933,192**	**1,066,067**	**1,054,263**	**1,043,157**	**1,032,126**	**1,023,734**	**1,016,199**	**1,009,118**	**1,005,015**	**1,001,735**
Pilots	35,143	42,753	50,717	57,938	57,297	56,691	56,088	55,642	55,217	54,809	54,542	54,282
Education	21,086	25,652	30,430	34,763	34,378	34,015	33,653	33,385	33,130	32,886	32,725	32,569
Total Savings	**702,851**	**855,061**	**1,014,339**	**1,158,769**	**1,145,938**	**1,133,863**	**1,121,867**	**1,112,762**	**1,104,546**	**1,096,813**	**1,092,282**	**1,088,586**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$57,655,861**	**$50,472,795**	**$65,990,635**	**$88,320,850**	**$88,735,415**	**$102,859,109**	**$113,597,611**	**$110,883,695**	**$102,364,498**	**$117,335,226**	**$119,231,594**	**$116,040,942**
Lighting	27,627,923	23,356,735	19,276,244	13,237,245	13,189,995	13,171,477	13,192,668	13,292,075	13,360,427	9,349,737	9,138,189	9,011,518
Appliances	8,065,217	7,020,472	14,738,918	15,134,064	15,664,952	16,259,158	16,950,656	17,812,082	18,647,254	19,340,043	15,475,100	15,552,786
Electronics	1,941,876	3,483,952	9,992,895	11,362,643	13,054,147	14,729,541	16,999,292	19,031,968	24,763,290	27,086,826	46,641,384	21,764,524
Water Heating	1,466,329	1,277,240	6,166,301	11,400,959	13,324,770	15,270,960	17,320,751	19,629,925	21,902,224	23,735,496	23,345,845	23,432,173
HVAC Shell	1,949,696	1,633,516	1,741,651	1,812,836	1,873,555	2,138,212	2,386,994	2,427,665	2,407,982	2,611,213	2,634,652	2,488,182
HVAC Equipment	10,664,380	9,158,496	9,859,457	30,480,467	26,401,066	35,242,559	39,907,729	31,559,034	14,016,993	27,256,790	14,947,450	36,146,121
Miscellaneous	317,850	275,487	298,025	706,751	802,640	900,754	1,004,709	1,121,448	1,237,217	1,334,244	437,306	1,448,790
Cross-Cutting	5,622,591	4,266,897	3,917,144	4,185,887	4,424,291	5,146,448	5,834,813	6,009,499	6,029,110	6,620,877	6,611,669	6,196,848
Commerical & Industrial	**$128,582,520**	**$161,490,306**	**$196,307,961**	**$233,529,403**	**$211,249,875**	**$175,111,187**	**$161,918,867**	**$158,308,405**	**$153,466,933**	**$148,659,507**	**$135,255,199**	**$144,054,155**
Lighting	78,252,042	78,426,149	78,694,684	78,860,962	71,904,458	56,138,665	52,175,863	53,918,722	55,721,945	53,710,248	45,201,790	46,580,203
Office Equipment	8,237,403	18,414,642	18,569,616	18,718,690	27,422,642	27,023,199	25,194,220	25,381,893	35,465,085	28,962,810	26,974,246	26,457,279
Refrigeration	4,639,461	6,764,505	27,343,247	39,604,910	32,736,440	30,949,901	28,024,998	24,891,032	7,747,691	13,510,276	20,430,625	26,100,105
HVAC	26,175,375	38,060,838	46,850,305	55,128,032	52,904,042	37,214,574	33,494,083	30,791,798	30,765,629	29,079,968	19,719,588	21,211,999
Compressed Air	2,072,150	3,494,919	6,356,731	6,959,400	6,818,202	5,724,864	5,553,972	5,824,354	6,101,860	6,075,000	5,719,361	5,787,815
Water Heating	166,660	243,402	842,051	846,420	732,805	480,483	405,238	417,863	419,672	372,296	394,884	397,885
Ventilation	2,306,827	3,361,232	4,145,844	19,160,104	4,887,913	4,936,331	4,790,761	4,686,646	4,688,138	4,571,391	4,238,138	4,412,052
Cooking	987,833	1,437,441	1,770,676	2,084,966	2,036,426	1,919,266	1,810,456	1,785,178	1,784,204	1,706,524	1,719,294	2,009,469
Pools	2,682,603	2,720,873	2,758,551	2,794,794	2,362,914	1,351,462	1,056,198	1,068,367	1,080,673	894,881	987,492	1,025,854
Other	808,588	1,175,759	1,447,298	1,703,025	1,635,400	1,339,661	1,235,578	1,217,794	1,216,593	1,145,909	963,431	1,000,896
Machine Drive	780,359	5,501,251	5,627,465	5,754,872	5,883,971	6,096,763	6,230,468	6,366,751	6,506,336	6,649,771	6,882,405	7,034,754
Process Cooling & Heating	1,392,868	1,808,456	1,820,176	1,831,449	1,842,435	1,853,342	1,863,921	1,874,466	1,885,128	1,896,010	1,908,374	1,919,726
Agriculture	80,350	80,837	81,317	81,778	82,228	82,678	83,111	83,542	83,978	84,424	115,571	116,118
Overall Program (Res + C&I)	**$186,238,381**	**$211,963,101**	**$262,298,597**	**$321,850,253**	**$299,985,289**	**$277,970,296**	**$275,516,479**	**$269,192,101**	**$255,831,432**	**$265,994,733**	**$254,486,793**	**$260,095,097**
Pilots	10,703,355	12,181,787	15,074,632	18,497,141	17,240,534	15,975,304	15,834,280	15,470,810	14,702,956	15,287,054	14,625,678	14,947,994
Education	6,422,013	7,309,072	9,044,779	11,098,285	10,344,320	9,585,183	9,500,568	9,282,486	8,821,774	9,172,232	8,775,407	8,968,796
EM&V	10,703,355	12,181,787	15,074,632	18,497,141	17,240,534	15,975,304	15,834,280	15,470,810	14,702,956	15,287,054	14,625,678	14,947,994
Performance Incentive	42,813,421	48,727,150	60,298,528	73,988,564	68,962,136	63,901,217	63,337,122	61,883,242	58,811,823	61,148,215	58,502,711	59,791,976
Total Spend	**$256,880,525**	**$292,362,898**	**$361,791,168**	**$443,931,383**	**$413,772,813**	**$383,407,304**	**$380,022,729**	**$371,299,449**	**$352,870,940**	**$366,889,287**	**$351,016,266**	**$358,751,858**

DTE Electric Company

WP KLB-19 EWR Model 2.50% Flat Costs Low: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
253,511	**258,136**	**257,724**	**233,261**	**225,823**	**239,397**	**264,351**	**252,065**	**251,746**	**251,802**
10,413	9,989	9,583	27,080	27,080	26,880	26,079	25,979	25,979	25,979
37,113	36,247	35,299	34,048	22,582	28,012	26,435	30,741	30,741	30,741
110,134	112,830	114,520	112,757	119,705	124,655	145,749	119,614	119,614	119,614
33,442	35,646	35,035	2,916	2,823	2,992	3,304	13,796	13,552	13,595
2,535	2,581	2,577	2,333	2,258	2,394	2,644	2,521	2,517	2,518
19,013	19,360	19,329	17,495	16,937	17,955	19,826	18,905	18,881	18,885
2,832	2,762	2,721	1,643	565	598	661	2,700	2,700	2,700
38,027	38,720	38,659	34,989	33,873	35,910	39,653	37,810	37,762	37,770
744,787	**738,597**	**736,242**	**762,248**	**769,840**	**756,108**	**732,225**	**742,696**	**741,756**	**741,921**
247,753	248,616	253,642	261,490	254,663	217,170	225,689	225,689	225,689	225,689
218,440	206,792	198,346	116,675	128,892	154,858	126,413	141,765	140,998	141,133
36,122	35,822	35,708	36,969	37,337	36,671	35,513	36,021	35,975	35,983
59,583	59,088	58,899	60,980	61,587	60,489	58,578	59,416	59,340	59,354
75,488	79,443	79,694	90,564	90,345	89,921	88,987	86,684	86,684	86,684
3,911	3,911	3,382	1,906	1,925	1,890	1,831	1,857	1,854	1,855
14,896	14,772	14,725	15,245	15,397	15,122	14,645	14,854	14,835	14,838
3,724	3,693	3,681	3,811	3,849	3,781	3,661	3,713	3,709	3,710
1,862	1,846	1,841	39,316	38,723	37,842	37,581	31,463	31,463	31,463
1,862	1,846	1,841	1,906	1,925	1,890	1,831	1,857	1,854	1,855
68,026	69,646	71,362	113,354	114,974	116,594	118,214	119,834	119,834	119,834
12,519	12,519	12,519	19,056	19,246	18,903	18,306	18,567	18,544	18,548
603	603	603	977	977	977	977	977	977	977
998,298	**996,733**	**993,965**	**995,509**	**995,663**	**995,504**	**996,576**	**994,761**	**993,502**	**993,723**
54,059	54,016	53,915	54,020	54,048	54,017	54,096	54,067	54,012	54,013
32,436	32,409	32,349	32,412	32,429	32,410	32,458	32,440	32,407	32,408
1,084,793	**1,083,158**	**1,080,230**	**1,081,940**	**1,082,139**	**1,081,932**	**1,083,130**	**1,081,268**	**1,079,921**	**1,080,144**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$83,745,412	**$86,813,497**	**$88,010,959**	**$71,323,666**	**$69,316,472**	**$75,610,806**	**$90,264,146**	**$82,139,692**	**$82,624,996**	**$83,319,055**
9,101,010	8,931,038	8,792,825	12,055,069	11,950,480	11,839,421	11,614,676	11,501,517	11,568,711	11,637,293
15,729,306	15,587,953	15,527,387	15,314,518	10,424,078	13,232,283	12,726,693	15,078,987	15,158,501	15,239,655
21,208,036	22,079,353	23,006,807	23,558,636	27,570,795	29,830,705	42,782,380	26,020,331	26,329,715	26,645,485
17,410,872	19,183,915	19,231,232	1,623,938	1,585,464	1,691,728	1,880,897	7,934,211	7,828,937	7,889,628
2,079,103	2,119,222	2,141,289	1,960,962	1,921,429	2,061,904	2,367,866	2,330,867	2,334,429	2,341,596
11,636,503	12,163,574	12,482,640	10,960,851	10,646,482	11,327,542	12,570,323	12,037,856	12,071,460	12,124,006
1,464,109	1,433,902	1,418,960	860,625	297,045	316,356	350,974	1,440,485	1,447,467	1,454,594
5,116,473	5,314,538	5,409,818	4,989,067	4,920,698	5,310,866	5,970,337	5,795,437	5,885,776	5,986,798
$186,575,810	**$187,902,745**	**$190,038,870**	**$212,966,164**	**$213,163,936**	**$199,581,740**	**$197,769,330**	**$201,768,430**	**$202,395,641**	**$203,252,360**
101,962,612	102,447,522	104,755,137	110,706,791	107,124,307	91,057,610	95,514,146	95,755,041	96,000,852	96,251,736
28,623,455	26,162,091	24,982,627	14,078,268	17,454,040	20,293,629	15,908,775	18,692,245	18,744,638	18,919,475
7,764,716	8,441,896	9,220,865	9,808,709	8,568,877	8,675,010	8,931,311	8,853,080	8,881,060	8,923,041
23,534,851	23,558,553	23,139,947	40,617,215	41,868,782	41,721,486	40,385,501	41,695,094	41,706,965	41,782,242
5,857,693	8,335,379	8,710,790	9,846,254	9,858,620	9,596,999	8,910,818	8,507,001	8,601,413	8,697,774
401,505	405,201	385,406	470,316	513,936	506,706	492,615	505,266	506,646	508,821
5,523,196	5,494,508	5,628,195	5,491,590	5,663,828	5,587,356	5,431,237	5,603,071	5,612,139	5,629,885
1,936,073	1,923,472	1,920,888	1,992,489	2,016,200	1,984,109	1,925,268	1,956,762	1,958,326	1,962,886
647,900	644,261	610,303	2,692,196	2,552,929	2,450,638	2,447,996	2,098,630	2,132,898	2,167,873
1,084,494	1,077,226	1,075,565	1,279,242	1,293,915	1,272,772	1,234,485	1,219,549	1,220,025	1,222,359
7,191,324	7,352,246	7,536,104	12,815,544	13,030,790	13,251,685	13,478,393	13,711,067	13,841,585	13,974,798
1,931,314	1,943,146	1,955,216	2,997,297	3,046,477	3,011,505	2,935,529	2,997,325	3,013,729	3,035,020
116,676	117,245	117,826	170,254	171,235	172,236	173,258	174,300	175,365	176,451
$270,321,222	**$274,716,242**	**$278,049,828**	**$284,289,830**	**$282,480,407**	**$275,192,546**	**$288,033,477**	**$283,908,122**	**$285,020,637**	**$286,571,415**
15,535,702	15,788,290	15,979,875	16,338,496	16,234,506	15,815,664	16,553,648	16,316,559	16,380,496	16,469,622
9,321,421	9,472,974	9,587,925	9,803,098	9,740,704	9,489,398	9,932,189	9,789,935	9,828,298	9,881,773
15,535,702	15,788,290	15,979,875	16,338,496	16,234,506	15,815,664	16,553,648	16,316,559	16,380,496	16,469,622
62,142,810	63,153,159	63,919,501	65,353,984	64,938,025	63,262,654	66,214,592	65,266,235	65,521,986	65,878,486
$372,856,857	**$378,918,955**	**$383,517,004**	**$392,123,904**	**$389,628,148**	**$379,575,926**	**$397,287,554**	**$391,597,409**	**$393,131,913**	**$395,270,918**

DTE Electric Company

WP KLB-20 EWR Model 2.50% Tiered Costs: Output

Case No: U-20471
Workpaper: KLB-20
Page: 1 of 2
Witness: K. L. Bilyeu

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**223,151**	**240,324**	**251,653**	**260,171**	**296,021**	**328,505**	**331,073**	**325,032**	**349,152**	**341,254**	**313,241**
Lighting	114,825	93,540	56,973	23,269	23,811	24,451	25,242	26,282	27,282	11,251	10,347	10,105
Appliances	33,138	32,759	37,710	48,152	49,918	51,791	53,840	56,196	58,482	60,649	38,014	37,364
Electronics	27,392	34,369	42,644	58,395	66,719	74,409	86,521	96,128	115,363	122,695	165,606	106,566
Water Heating	7,716	2,789	14,335	24,537	28,431	32,239	36,104	40,300	44,254	47,202	46,240	45,786
HVAC Shell	3,225	2,232	18,961	2,517	2,602	2,960	3,285	3,311	3,250	3,492	3,413	3,132
HVAC Equipment	17,476	16,736	32,806	55,616	48,061	63,974	72,245	56,980	25,213	48,877	25,594	60,486
Miscellaneous	560	558	848	1,419	1,604	1,793	1,992	2,215	2,434	2,614	853	2,815
Cross-Cutting	54,316	40,167	36,049	37,748	39,026	44,403	49,276	49,661	48,755	52,373	51,188	46,986
Commerical & Industrial	**387,974**	**563,505**	**692,868**	**814,414**	**794,092**	**747,136**	**703,620**	**692,662**	**691,086**	**659,886**	**663,682**	**688,416**
Lighting	133,750	133,750	143,188	184,522	169,020	131,527	124,761	128,012	132,201	129,210	109,761	113,074
Office Equipment	118,907	118,907	126,691	165,429	206,364	240,455	222,665	222,665	279,589	227,912	233,827	223,626
Refrigeration	18,817	117,561	124,418	158,546	162,230	138,287	125,184	106,716	38,776	64,954	89,777	117,065
HVAC	31,038	45,080	100,707	65,153	63,527	59,771	56,290	55,413	55,287	52,791	53,095	55,073
Compressed Air	20,043	28,581	38,578	61,070	67,179	66,370	68,396	72,198	75,999	78,001	75,488	75,488
Water Heating	3,645	3,645	3,846	4,847	4,121	2,580	2,108	2,123	2,123	1,823	3,917	3,911
Ventilation	7,759	58,743	73,330	63,850	15,882	14,943	14,072	13,853	13,822	13,198	13,274	13,768
Cooking	1,940	2,818	7,983	4,072	3,970	3,736	3,518	3,463	3,455	3,299	3,318	3,442
Pools	970	1,409	9,248	40,220	33,523	18,791	14,438	14,438	14,438	11,759	1,659	1,721
Other	970	1,409	10,139	2,036	1,985	1,868	1,759	1,732	1,728	1,650	1,659	1,721
Machine Drive	38,573	40,041	42,935	51,646	53,266	55,786	57,406	59,026	60,646	62,266	64,786	66,406
Process Cooling & Heating	11,092	11,092	11,330	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,519	12,519
Agriculture	469	469	476	512	512	512	512	512	512	512	603	603
Overall Program (Res + C&I)	**646,623**	**786,656**	**933,192**	**1,066,067**	**1,054,263**	**1,043,157**	**1,032,126**	**1,023,734**	**1,016,118**	**1,009,038**	**1,004,936**	**1,001,657**
Pilots	35,143	42,753	50,717	57,938	57,297	56,691	56,088	55,611	55,174	54,762	54,491	54,293
Education	21,086	25,652	30,430	34,763	34,378	34,015	33,653	33,366	33,104	32,857	32,695	32,576
Total Savings	**702,851**	**855,061**	**1,014,339**	**1,158,769**	**1,145,938**	**1,133,863**	**1,121,867**	**1,112,711**	**1,104,397**	**1,096,657**	**1,092,121**	**1,088,526**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$39,600,193**	**$37,864,943**	**$59,083,170**	**$116,396,540**	**$116,425,351**	**$134,914,668**	**$148,652,855**	**$144,385,316**	**$132,170,754**	**$152,204,744**	**$154,954,860**	**$151,367,437**
Lighting	15,192,489	13,007,805	11,042,573	18,006,396	17,896,588	17,822,984	17,799,397	17,875,701	17,907,345	12,860,617	12,588,897	12,409,476
Appliances	7,176,137	8,137,907	10,539,158	19,749,511	20,394,716	21,123,178	21,981,435	23,066,095	24,111,650	24,954,039	20,396,438	20,502,185
Electronics	3,741,531	5,147,464	6,956,126	13,963,828	15,997,279	18,019,064	20,695,008	23,117,787	30,390,777	33,284,646	59,177,280	26,197,690
Water Heating	1,979,097	828,929	4,843,505	15,333,880	17,905,497	20,505,826	23,246,002	26,336,161	29,376,495	31,826,265	31,255,396	31,371,621
HVAC Shell	1,153,480	925,910	8,981,937	2,492,004	2,573,112	2,934,320	3,273,697	3,327,893	3,299,240	3,576,034	3,609,908	3,410,399
HVAC Equipment	5,124,891	5,701,550	12,714,991	41,382,966	35,805,804	47,747,325	54,013,639	42,671,397	18,917,550	36,764,333	20,199,936	48,841,723
Miscellaneous	161,295	186,170	321,757	954,532	1,082,867	1,213,939	1,352,647	1,508,279	1,662,281	1,790,789	586,278	1,940,418
Cross-Cutting	5,071,274	3,929,209	3,683,123	4,513,423	4,769,486	5,548,031	6,291,030	6,482,003	6,505,416	7,148,022	7,140,728	6,693,925
Commerical & Industrial	**$58,998,406**	**$97,252,026**	**$151,573,124**	**$320,290,977**	**$288,496,678**	**$237,376,605**	**$219,019,914**	**$213,803,360**	**$206,644,335**	**$200,098,707**	**$180,625,690**	**$192,458,966**
Lighting	30,093,471	35,655,319	43,819,698	109,640,052	99,892,156	77,947,884	72,357,275	74,744,037	77,197,097	74,329,493	62,493,836	64,356,278
Office Equipment	8,632,730	9,694,255	11,457,959	24,034,836	35,721,768	34,490,788	32,101,632	32,289,305	45,576,661	37,143,129	34,103,250	33,471,136
Refrigeration	2,290,235	16,595,392	19,981,623	53,984,891	44,051,483	41,848,296	37,848,662	33,655,656	10,348,576	18,080,369	27,470,099	35,006,557
HVAC	9,320,249	16,138,937	41,864,369	77,688,535	74,514,094	52,141,098	46,865,270	43,000,163	42,941,346	40,559,202	27,162,399	29,235,358
Compressed Air	2,139,099	2,921,454	3,882,431	8,942,996	8,616,064	7,042,896	6,739,315	7,033,079	7,333,968	7,230,096	6,739,906	6,808,360
Water Heating	376,110	432,539	515,895	1,129,876	977,894	642,259	542,075	559,092	560,902	497,995	489,889	492,771
Ventilation	1,055,856	9,316,748	13,281,160	26,327,102	6,716,955	6,796,256	6,598,089	6,448,178	6,445,292	6,284,961	5,802,450	6,036,156
Cooking	529,885	915,861	3,009,104	2,911,911	2,842,736	2,677,897	2,524,902	2,488,497	2,485,782	2,376,428	2,393,052	2,803,874
Pools	179,302	306,888	2,319,565	3,334,630	2,814,588	1,609,180	1,256,610	1,268,779	1,281,085	1,060,028	1,379,147	1,432,106
Other	421,161	733,448	6,154,914	2,399,587	2,303,064	1,881,846	1,734,379	1,708,827	1,706,413	1,606,248	1,344,777	1,396,455
Machine Drive	2,915,557	3,349,209	3,919,083	7,376,400	7,514,282	7,755,252	7,897,740	8,042,805	8,191,172	8,343,389	8,604,203	8,765,333
Process Cooling & Heating	1,000,425	1,141,261	1,309,355	2,411,707	2,422,692	2,433,599	2,444,179	2,454,723	2,465,386	2,476,267	2,489,002	2,500,354
Agriculture	44,326	50,715	57,969	108,453	108,903	109,355	109,788	110,219	110,655	111,100	153,681	154,228
Overall Program (Res + C&I)	**$98,598,600**	**$135,116,968**	**$210,656,295**	**$436,687,517**	**$404,922,028**	**$372,291,273**	**$367,672,769**	**$358,188,676**	**$338,815,089**	**$352,303,451**	**$335,580,551**	**$343,826,403**
Pilots	5,666,586	7,765,343	12,106,684	25,096,984	23,271,381	21,396,050	21,130,619	20,585,556	19,472,132	20,247,325	19,286,239	19,760,138
Education	3,399,952	4,659,206	7,264,010	15,058,190	13,962,829	12,837,630	12,678,371	12,351,334	11,683,279	12,148,395	11,571,743	11,856,083
EM&V	5,666,586	7,765,343	12,106,684	25,096,984	23,271,381	21,396,050	21,130,619	20,585,556	19,472,132	20,247,325	19,286,239	19,760,138
Performance Incentive	22,666,345	31,061,372	48,426,734	100,387,935	93,085,524	85,584,201	84,522,476	82,342,224	77,888,526	80,989,299	77,144,954	79,040,552
Total Spend	**$135,998,068**	**$186,368,232**	**$290,560,407**	**$602,327,610**	**$558,513,143**	**$513,505,204**	**$507,134,854**	**$494,053,347**	**$467,331,157**	**$485,935,794**	**$462,869,725**	**$474,243,315**

DTE Electric Company

WP KLB-20 EWR Model 2.50% Tiered Costs: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
253,491	**258,105**	**257,693**	**233,236**	**225,847**	**239,436**	**264,403**	**252,109**	**251,816**	**251,914**
10,413	9,989	9,583	27,080	27,080	26,880	26,079	25,979	25,979	25,979
37,113	36,247	35,299	34,048	22,585	28,041	26,440	30,741	30,741	30,741
110,134	112,830	114,520	112,757	119,720	124,655	145,782	119,614	119,614	119,614
33,427	35,622	35,012	2,915	2,823	2,993	3,305	13,830	13,606	13,680
2,535	2,581	2,577	2,332	2,258	2,394	2,644	2,521	2,518	2,519
19,012	19,358	19,327	17,493	16,939	17,958	19,830	18,908	18,886	18,894
2,832	2,762	2,721	1,624	565	599	661	2,700	2,700	2,700
38,024	38,716	38,654	34,985	33,877	35,915	39,660	37,816	37,772	37,787
744,729	**738,508**	**736,155**	**762,165**	**769,922**	**756,230**	**732,367**	**742,825**	**741,962**	**742,250**
247,753	248,616	253,642	261,490	254,663	217,170	225,689	225,689	225,689	225,689
218,391	206,717	198,274	116,608	128,958	154,958	126,529	141,870	141,166	141,401
36,119	35,818	35,704	36,965	37,341	36,677	35,520	36,027	35,985	35,999
59,578	59,081	58,892	60,973	61,594	60,498	58,589	59,426	59,357	59,380
75,488	79,443	79,694	90,564	90,345	89,921	88,987	86,684	86,684	86,684
3,911	3,911	3,382	1,905	1,925	1,891	1,831	1,857	1,855	1,856
14,895	14,770	14,723	15,243	15,398	15,125	14,647	14,856	14,839	14,845
3,724	3,693	3,681	3,811	3,850	3,781	3,662	3,714	3,710	3,711
1,862	1,846	1,840	39,316	38,723	37,842	37,581	31,463	31,463	31,463
1,862	1,846	1,840	1,905	1,925	1,891	1,831	1,857	1,855	1,856
68,026	69,646	71,362	113,354	114,974	116,594	118,214	119,834	119,834	119,834
12,519	12,519	12,519	19,054	19,248	18,906	18,309	18,571	18,549	18,556
603	603	603	977	977	977	977	977	977	977
998,220	**996,613**	**993,849**	**995,401**	**995,769**	**995,665**	**996,770**	**994,933**	**993,778**	**994,164**
54,086	54,010	53,894	53,956	53,950	53,936	54,060	54,030	53,975	53,976
32,451	32,406	32,336	32,374	32,370	32,362	32,436	32,418	32,385	32,386
1,084,757	**1,083,029**	**1,080,078**	**1,081,731**	**1,082,089**	**1,081,963**	**1,083,265**	**1,081,381**	**1,080,138**	**1,080,525**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$107,741,599	**$111,651,723**	**$113,129,270**	**$90,254,819**	**$87,551,621**	**$95,617,700**	**$114,973,835**	**$103,753,106**	**$104,202,731**	**$104,935,396**
12,513,361	12,280,822	12,093,379	15,872,504	15,695,410	15,518,879	15,211,623	15,027,069	15,094,264	15,162,845
20,730,896	20,534,705	20,458,894	20,181,735	13,744,966	17,468,043	16,784,630	19,880,399	19,959,913	20,041,068
25,135,082	26,144,937	27,276,653	28,038,110	33,305,671	36,148,097	53,413,174	30,708,974	31,018,359	31,334,128
23,294,687	25,683,412	25,745,914	2,174,424	2,121,670	2,261,869	2,512,530	10,614,870	10,478,107	10,571,860
2,851,102	2,903,637	2,932,834	2,684,881	2,630,375	2,821,833	3,243,333	3,194,170	3,196,972	3,204,865
15,731,179	16,448,500	16,886,811	14,785,244	14,349,758	15,253,161	16,911,173	16,178,287	16,208,344	16,264,518
1,958,823	1,916,315	1,894,249	1,134,279	395,690	420,955	466,492	1,911,976	1,918,959	1,926,085
5,526,470	5,739,395	5,840,536	5,383,641	5,308,081	5,724,862	6,430,879	6,237,360	6,327,814	6,430,027
$251,824,559	**$253,536,864**	**$256,332,157**	**$288,228,105**	**$288,060,431**	**$268,628,978**	**$266,237,531**	**$271,375,170**	**$271,965,929**	**$272,863,970**
140,770,988	141,345,977	144,436,526	152,667,307	147,583,069	125,337,893	131,417,111	131,658,006	131,903,817	132,154,701
36,571,153	33,197,204	31,600,792	17,654,077	22,186,604	25,624,294	19,926,732	23,495,187	23,532,262	23,728,684
10,378,702	11,336,961	12,437,220	13,235,506	11,443,178	11,593,608	11,969,586	11,829,762	11,855,214	11,899,838
32,442,707	32,461,023	31,842,630	56,739,254	58,500,342	58,290,079	56,398,528	58,222,695	58,219,712	58,308,340
6,878,238	10,307,534	10,805,861	12,166,333	12,149,700	11,745,545	10,745,790	10,180,616	10,275,028	10,371,389
496,391	500,087	481,067	631,837	693,067	682,680	663,053	679,681	680,912	683,240
7,595,693	7,550,852	7,736,696	7,524,518	7,762,403	7,652,809	7,433,856	7,667,760	7,675,015	7,694,500
2,692,110	2,673,112	2,668,144	2,766,164	2,798,181	2,752,295	2,669,277	2,711,356	2,712,247	2,717,426
888,753	883,074	833,930	3,021,271	2,818,082	2,674,201	2,659,271	2,282,203	2,316,470	2,351,445
1,512,410	1,501,521	1,498,511	1,787,320	1,807,442	1,777,237	1,723,072	1,700,263	1,700,308	1,703,032
8,930,686	9,100,390	9,299,000	15,930,103	16,154,131	16,383,808	16,619,298	16,860,754	16,991,272	17,124,485
2,511,942	2,523,774	2,535,843	3,881,690	3,940,523	3,889,822	3,786,228	3,860,114	3,875,833	3,897,967
154,786	155,355	155,936	222,727	223,708	224,709	225,731	226,773	227,837	228,923
$359,566,158	**$365,188,587**	**$369,461,427**	**$378,482,924**	**$375,612,051**	**$364,246,677**	**$381,211,366**	**$375,128,275**	**$376,168,660**	**$377,799,366**
20,664,722	20,987,850	21,233,415	21,751,892	21,586,900	20,933,717	21,908,699	21,559,096	21,618,889	21,712,607
12,398,833	12,592,710	12,740,049	13,051,135	12,952,140	12,560,230	13,145,220	12,935,458	12,971,333	13,027,564
20,664,722	20,987,850	21,233,415	21,751,892	21,586,900	20,933,717	21,908,699	21,559,096	21,618,889	21,712,607
82,658,887	83,951,399	84,933,661	87,007,569	86,347,598	83,734,868	87,634,797	86,236,385	86,475,554	86,850,429
$495,953,321	**$503,708,395**	**$509,601,968**	**$522,045,412**	**$518,085,588**	**$502,409,210**	**$525,808,781**	**$517,418,311**	**$518,853,324**	**$521,102,574**

DTE Electric Company

WP KLB-21 EWR Model 2.50%_Flat Costs High: Output

Net MWh Savings

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**258,649**	**223,151**	**240,324**	**251,653**	**260,171**	**296,021**	**328,505**	**331,073**	**325,058**	**349,179**	**341,281**	**313,265**
Lighting	142,257	119,956	71,076	23,269	23,811	24,451	25,242	26,282	27,282	11,251	10,347	10,105
Appliances	25,865	22,315	46,637	48,152	49,918	51,791	53,840	56,196	58,482	60,649	38,014	37,364
Electronics	10,346	18,398	52,187	58,395	66,719	74,409	86,521	96,128	115,363	122,695	165,606	106,566
Water Heating	3,233	2,789	13,347	24,537	28,431	32,239	36,104	40,300	44,254	47,202	46,260	45,786
HVAC Shell	2,586	2,232	2,403	2,517	2,602	2,960	3,285	3,311	3,251	3,492	3,413	3,133
HVAC Equipment	19,399	16,736	18,024	55,616	48,061	63,974	72,245	56,980	25,234	48,900	25,596	60,506
Miscellaneous	647	558	601	1,419	1,604	1,793	1,992	2,215	2,434	2,614	853	2,815
Cross-Cutting	54,316	40,167	36,049	37,748	39,026	44,403	49,276	49,661	48,759	52,377	51,192	46,990
Commerical & Industrial	**387,974**	**563,505**	**692,868**	**814,414**	**794,092**	**747,136**	**703,620**	**692,662**	**691,141**	**659,938**	**663,734**	**688,470**
Lighting	182,981	182,981	184,522	184,522	169,020	131,527	124,761	128,012	132,201	129,210	109,761	113,074
Office Equipment	74,639	165,429	165,429	165,429	206,364	240,455	222,665	222,665	279,589	227,912	233,827	223,626
Refrigeration	18,817	27,330	109,857	158,546	162,230	138,287	125,184	106,716	38,825	65,001	89,823	117,113
HVAC	31,038	45,080	55,429	65,153	63,527	59,771	56,290	55,413	55,291	52,795	53,099	55,078
Compressed Air	11,639	24,131	50,461	61,070	67,179	66,370	68,396	72,198	75,999	78,001	75,488	75,488
Water Heating	970	1,409	4,847	4,847	4,121	2,580	2,108	2,123	2,123	1,823	3,917	3,911
Ventilation	7,759	11,270	13,857	63,850	15,882	14,943	14,072	13,853	13,823	13,199	13,275	13,769
Cooking	1,940	2,818	3,464	4,072	3,970	3,736	3,518	3,463	3,456	3,300	3,319	3,442
Pools	40,220	40,220	40,220	40,220	33,523	18,791	14,438	14,438	14,438	11,759	1,659	1,721
Other	970	1,409	1,732	2,036	1,985	1,868	1,759	1,732	1,728	1,650	1,659	1,721
Machine Drive	6,790	48,406	50,026	51,646	53,266	55,786	57,406	59,026	60,646	62,266	64,786	66,406
Process Cooling & Heating	9,699	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,510	12,519	12,519
Agriculture	512	512	512	512	512	512	512	512	512	512	603	603
Overall Program (Res + C&I)	**646,623**	**786,656**	**933,192**	**1,066,067**	**1,054,263**	**1,043,157**	**1,032,126**	**1,023,734**	**1,016,199**	**1,009,118**	**1,005,015**	**1,001,735**
Pilots	35,143	42,753	50,717	57,938	57,297	56,691	56,088	55,642	55,217	54,809	54,542	54,282
Education	21,086	25,652	30,430	34,763	34,378	34,015	33,653	33,385	33,130	32,886	32,725	32,569
Total Savings	**702,851**	**855,061**	**1,014,339**	**1,158,769**	**1,145,938**	**1,133,863**	**1,121,867**	**1,112,762**	**1,104,546**	**1,096,813**	**1,092,282**	**1,088,586**

Spend $MM

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	**$57,655,861**	**$63,852,547**	**$85,156,740**	**$116,396,540**	**$116,425,351**	**$134,914,668**	**$148,652,855**	**$144,385,316**	**$132,187,776**	**$152,223,031**	**$154,971,169**	**$151,384,830**
Lighting	27,627,923	28,931,161	24,841,551	18,006,396	17,896,588	17,822,984	17,799,397	17,875,701	17,907,345	12,860,617	12,588,897	12,409,476
Appliances	8,065,217	9,204,101	19,286,619	19,749,511	20,394,716	21,123,178	21,981,435	23,066,095	24,111,650	24,954,039	20,396,438	20,502,185
Electronics	1,941,876	4,296,782	12,296,105	13,963,828	15,997,279	18,019,064	20,695,008	23,117,787	30,390,777	33,284,646	59,177,280	26,197,690
Water Heating	1,466,329	1,721,485	8,302,738	15,333,880	17,905,497	20,505,826	23,246,002	26,336,161	29,376,495	31,826,265	31,269,225	31,371,621
HVAC Shell	1,949,696	2,251,080	2,396,918	2,492,004	2,573,112	2,934,320	3,273,697	3,327,893	3,299,502	3,576,317	3,610,191	3,410,666
HVAC Equipment	10,664,380	12,464,707	13,401,270	41,382,966	35,805,804	47,747,325	54,013,639	42,671,397	18,933,794	36,781,772	20,201,524	48,858,327
Miscellaneous	317,850	372,924	402,960	954,532	1,082,867	1,213,939	1,352,647	1,508,279	1,662,281	1,790,789	586,324	1,940,418
Cross-Cutting	5,622,591	4,610,307	4,228,580	4,513,423	4,769,486	5,548,031	6,291,030	6,482,003	6,505,931	7,148,587	7,141,289	6,694,448
Commerical & Industrial	**$128,582,520**	**$221,926,295**	**$269,373,367**	**$320,290,977**	**$288,496,678**	**$237,376,605**	**$219,019,914**	**$213,803,360**	**$206,661,636**	**$200,115,685**	**$180,642,895**	**$192,476,480**
Lighting	78,252,042	109,188,231	109,473,773	109,640,052	99,892,156	77,947,884	72,357,275	74,744,037	77,197,097	74,329,493	62,493,836	64,356,278
Office Equipment	8,237,403	23,730,788	23,885,762	24,034,836	35,721,768	34,490,788	32,101,632	32,289,305	45,576,661	37,143,129	34,103,250	33,471,136
Refrigeration	4,639,461	9,238,033	37,307,136	53,984,891	44,051,483	41,848,296	37,848,662	33,655,656	10,361,630	18,093,329	27,484,309	35,020,874
HVAC	26,175,375	53,670,695	66,043,681	77,688,535	74,514,094	52,141,098	46,865,270	43,000,163	42,944,751	40,562,409	27,164,535	29,237,643
Compressed Air	2,072,150	4,617,001	8,275,073	8,942,996	8,616,064	7,042,896	6,739,315	7,033,079	7,333,968	7,230,096	6,739,906	6,808,360
Water Heating	166,660	325,782	1,125,508	1,129,876	977,894	642,259	542,075	559,092	560,902	497,995	489,889	492,771
Ventilation	2,306,827	4,626,278	5,701,303	26,327,102	6,716,955	6,796,256	6,598,089	6,448,178	6,445,803	6,285,458	5,802,906	6,036,628
Cooking	987,833	2,009,616	2,474,205	2,911,911	2,842,736	2,677,897	2,524,902	2,488,497	2,485,979	2,376,616	2,393,240	2,804,094
Pools	2,682,603	3,260,708	3,298,386	3,334,630	2,814,588	1,609,180	1,256,610	1,268,779	1,281,085	1,060,028	1,379,256	1,432,218
Other	808,588	1,657,721	2,039,903	2,399,587	2,303,064	1,881,846	1,734,379	1,708,827	1,706,548	1,606,375	1,344,882	1,396,564
Machine Drive	780,359	7,105,215	7,240,211	7,376,400	7,514,282	7,755,252	7,897,740	8,042,805	8,191,172	8,343,389	8,604,203	8,765,333
Process Cooling & Heating	1,392,868	2,388,713	2,400,433	2,411,707	2,422,692	2,433,599	2,444,179	2,454,723	2,465,386	2,476,267	2,489,002	2,500,354
Agriculture	80,350	107,513	107,992	108,453	108,903	109,355	109,788	110,219	110,655	111,100	153,681	154,228
Overall Program (Res + C&I)	**$186,238,381**	**$285,778,841**	**$354,530,106**	**$436,687,517**	**$404,922,028**	**$372,291,273**	**$367,672,769**	**$358,188,676**	**$338,849,412**	**$352,338,716**	**$335,614,064**	**$343,861,311**
Pilots	10,703,355	16,424,071	20,375,293	25,096,984	23,271,381	21,396,050	21,130,619	20,585,556	19,474,104	20,249,352	19,288,165	19,762,144
Education	6,422,013	9,854,443	12,225,176	15,058,190	13,962,829	12,837,630	12,678,371	12,351,334	11,684,462	12,149,611	11,572,899	11,857,287
EM&V	10,703,355	16,424,071	20,375,293	25,096,984	23,271,381	21,396,050	21,130,619	20,585,556	19,474,104	20,249,352	19,288,165	19,762,144
Performance Incentive	42,813,421	65,696,285	81,501,174	100,387,935	93,085,524	85,584,201	84,522,476	82,342,224	77,896,417	80,997,406	77,152,658	79,048,577
Total Spend	**$256,880,525**	**$394,177,712**	**$489,007,043**	**$602,327,610**	**$558,513,143**	**$513,505,204**	**$507,134,854**	**$494,053,347**	**$467,378,500**	**$485,984,436**	**$462,915,950**	**$474,291,463**

DTE Electric Company

WP KLB-21 EWR Model 2.50%_Flat Costs High: Output

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
253,511	**258,136**	**257,724**	**233,261**	**225,823**	**239,397**	**264,351**	**252,065**	**251,746**	**251,802**
10,413	9,989	9,583	27,080	27,080	26,880	26,079	25,979	25,979	25,979
37,113	36,247	35,299	34,048	22,582	28,012	26,435	30,741	30,741	30,741
110,134	112,830	114,520	112,757	119,705	124,655	145,749	119,614	119,614	119,614
33,442	35,646	35,035	2,916	2,823	2,992	3,304	13,796	13,552	13,595
2,535	2,581	2,577	2,333	2,258	2,394	2,644	2,521	2,517	2,518
19,013	19,360	19,329	17,495	16,937	17,955	19,826	18,905	18,881	18,885
2,832	2,762	2,721	1,643	565	598	661	2,700	2,700	2,700
38,027	38,720	38,659	34,989	33,873	35,910	39,653	37,810	37,762	37,770
744,787	**738,597**	**736,242**	**762,248**	**769,840**	**756,108**	**732,225**	**742,696**	**741,756**	**741,921**
247,753	248,616	253,642	261,490	254,663	217,170	225,689	225,689	225,689	225,689
218,440	206,792	198,346	116,675	128,892	154,858	126,413	141,765	140,998	141,133
36,122	35,822	35,708	36,969	37,337	36,671	35,513	36,021	35,975	35,983
59,583	59,088	58,899	60,980	61,587	60,489	58,578	59,416	59,340	59,354
75,488	79,443	79,694	90,564	90,345	89,921	88,987	86,684	86,684	86,684
3,911	3,911	3,382	1,906	1,925	1,890	1,831	1,857	1,854	1,855
14,896	14,772	14,725	15,245	15,397	15,122	14,645	14,854	14,835	14,838
3,724	3,693	3,681	3,811	3,849	3,781	3,661	3,713	3,709	3,710
1,862	1,846	1,841	39,316	38,723	37,842	37,581	31,463	31,463	31,463
1,862	1,846	1,841	1,906	1,925	1,890	1,831	1,857	1,854	1,855
68,026	69,646	71,362	113,354	114,974	116,594	118,214	119,834	119,834	119,834
12,519	12,519	12,519	19,056	19,246	18,903	18,306	18,567	18,544	18,548
603	603	603	977	977	977	977	977	977	977
998,298	**996,733**	**993,965**	**995,509**	**995,663**	**995,504**	**996,576**	**994,761**	**993,502**	**993,723**
54,059	54,016	53,915	54,020	54,048	54,017	54,096	54,067	54,012	54,013
32,436	32,409	32,349	32,412	32,429	32,410	32,458	32,440	32,407	32,408
1,084,793	**1,083,158**	**1,080,230**	**1,081,940**	**1,082,139**	**1,081,932**	**1,083,130**	**1,081,268**	**1,079,921**	**1,080,144**

2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
$107,753,982	**$111,671,874**	**$113,149,354**	**$90,270,872**	**$87,543,190**	**$95,595,341**	**$114,952,640**	**$103,722,954**	**$104,154,417**	**$104,857,949**
12,513,361	12,280,822	12,093,379	15,872,504	15,695,410	15,518,879	15,211,623	15,027,069	15,094,264	15,162,845
20,730,896	20,534,705	20,458,894	20,181,735	13,743,506	17,449,965	16,781,376	19,880,399	19,959,913	20,041,068
25,135,082	26,144,937	27,276,653	28,038,110	33,301,334	36,148,097	53,400,965	30,708,974	31,018,359	31,334,128
23,305,195	25,700,543	25,762,977	2,174,660	2,121,445	2,261,504	2,512,043	10,589,165	10,436,934	10,505,887
2,851,324	2,903,987	2,933,179	2,685,173	2,630,095	2,821,377	3,242,705	3,193,615	3,196,085	3,203,445
15,732,402	16,450,479	16,888,799	14,786,852	14,348,234	15,250,696	16,907,894	16,175,478	16,203,846	16,257,313
1,958,823	1,916,315	1,894,249	1,147,610	395,648	420,887	466,401	1,911,976	1,918,959	1,926,085
5,526,899	5,740,086	5,841,224	5,384,227	5,307,517	5,723,937	6,429,632	6,236,277	6,326,058	6,427,178
$251,837,035	**$253,555,662**	**$256,350,490**	**$288,247,766**	**$288,039,713**	**$268,598,474**	**$266,202,861**	**$271,342,678**	**$271,913,837**	**$272,780,418**
140,770,988	141,345,977	144,436,526	152,667,307	147,583,069	125,337,893	131,417,111	131,658,006	131,903,817	132,154,701
36,579,314	33,209,214	31,612,413	17,664,323	22,175,119	25,607,792	19,908,473	23,477,745	23,504,236	23,683,631
10,379,509	11,338,326	12,438,684	13,236,945	11,441,963	11,591,734	11,967,265	11,827,707	11,851,924	11,894,566
32,445,229	32,464,929	31,846,378	56,745,425	58,494,129	58,280,659	56,387,593	58,212,584	58,203,555	58,282,510
6,878,238	10,307,534	10,805,861	12,166,333	12,149,700	11,745,545	10,745,790	10,180,616	10,275,028	10,371,389
496,391	500,087	481,067	631,906	692,994	682,569	662,924	679,563	680,723	682,937
7,596,283	7,551,760	7,737,607	7,525,336	7,761,578	7,651,572	7,432,414	7,666,429	7,672,886	7,691,091
2,692,320	2,673,433	2,668,458	2,766,465	2,797,884	2,751,850	2,668,759	2,710,885	2,711,494	2,716,223
888,822	883,180	834,028	3,021,271	2,818,082	2,674,201	2,659,271	2,282,203	2,316,470	2,351,445
1,512,527	1,501,702	1,498,688	1,787,514	1,807,250	1,776,950	1,722,738	1,699,968	1,699,837	1,702,277
8,930,686	9,100,390	9,299,000	15,930,103	16,154,131	16,383,808	16,619,298	16,860,754	16,991,272	17,124,485
2,511,942	2,523,774	2,535,843	3,882,112	3,940,105	3,889,193	3,785,494	3,859,444	3,874,758	3,896,240
154,786	155,355	155,936	222,727	223,708	224,709	225,731	226,773	227,837	228,923
$359,591,017	**$365,227,535**	**$369,499,844**	**$378,518,638**	**$375,582,903**	**$364,193,815**	**$381,155,500**	**$375,065,632**	**$376,068,254**	**$377,638,367**
20,666,150	20,990,088	21,235,623	21,753,945	21,585,224	20,930,679	21,905,489	21,555,496	21,613,118	21,703,354
12,399,690	12,594,053	12,741,374	13,052,367	12,951,135	12,558,407	13,143,293	12,933,298	12,967,871	13,022,013
20,666,150	20,990,088	21,235,623	21,753,945	21,585,224	20,930,679	21,905,489	21,555,496	21,613,118	21,703,354
82,664,602	83,960,353	84,942,493	87,015,779	86,340,897	83,722,716	87,621,954	86,221,984	86,452,472	86,813,418
$495,987,610	**$503,762,117**	**$509,654,958**	**$522,094,673**	**$518,045,383**	**$502,336,297**	**$525,731,725**	**$517,331,906**	**$518,714,833**	**$520,880,507**

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.19a
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: On p. 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the Company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

a. Was any similar adjustment made to account for transmission losses? If not, why not?

Answer: The average line loss rate of 6.8%, approved by the MPSC in DTE Electric's General Rate Case No. U-15244, represents the amount of energy and demand that would have been required to be purchased at the Company's 120 kV interconnect and includes transmission and distribution system losses.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.19b
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: On p. 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the Company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

b. Would Mr. Bilyeu agree that marginal loss rates in any given hour (i.e. the amount by which losses would decline if loads in the hour were reduced by 1 kWh) are higher than average loss rates in the hour? If not, why not? If so, why did DTEuse average loss rates rather than marginal loss rates to "gross up" customer savings?

Answer: The Company has not conducted an analysis of marginal line losses. Consistent with all previous EWR plans approved by the MPSC, the Company uses the less variable value for the calculations.

Attachments: *N/A*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-4.19c
Respondent:	K. L. Bilyeu
Page:	1 of 1

Question: On p. 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the Company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

c. Would Mr. Bilyeu agree that because loss rates grow as load grows that the average loss rate during hours of peak demand is greater than the weighted average loss rate across an entire year? If not, why not? If so, why did DTE use an average annual loss rate to convert customer savings during peak hours to savings at the generator?

Answer: Please see response to question MECNRDCSCDE-4.19b.

Attachments: *N/A*

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-8.24a.i
Respondent: Y. Zhou
Page: 1 of 1

Question: On page 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

a. In response to MECNRDCSCDE-4.19b, Mr. Bilyeu stated that DTE "has not conducted an analysis of marginal line losses." Has the Company ever analyzed or estimated average loss rates during summer peak or other high load hours?

i. If so, how much higher were average losses during such peak hours than the average loss rate for the year of 6.8%?

Answer: DTE Electric performed a line loss study in 1999. Please see attachment "U-20471 MECNRDCSCDE-8.24a.i line loss study 1999". The study analyzed average loss rates for each month but did not analyze loss rates for summer peak hours. Therefore, the Company cannot provide the loss rates during peak hours as compared to average loss rates for the whole year.

Please note that due to the vintage of the line loss study, DTE Electric believes the study results no longer properly reflect the loss rates on DTE Electric's system. The 6.8% is calcualted by dividing energy produced (refered to as not system output or NSO) by sales. It was not arrived at via an engineering study of line losses.

Attachments: The following documents are available for download at the following hyperlink:
https://dteenergy.sharepoint.com/sites/DiscoveryPortal/Elec/U-204712019IRPPublic/default.aspx

U-20471 MECNRDCSCDE-8.24a.i line loss study 1999

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-8.24a.ii
Respondent:	Y. Zhou
Page:	1 of 1

Question: On page 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

a. In response to MECNRDCSCDE-4.19b, Mr. Bilyeu stated that DTE "has not conducted an analysis of marginal line losses." Has the Company ever analyzed or estimated average loss rates during summer peak or other high load hours?

ii. Please provide the results of all such analyses, including any reports, memos, data, and other documentation of such analyses and/or how the results were derived.

Answer: See the response to 8.24a.i.

Attachments: N/A

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-8.24b.i
Respondent: Y. Zhou
Page: 1 of 1

Question: On page 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

b. Regardless of whether the Company has analyzed or estimated its marginal line loss rates and regardless of what loss rates the MPSC has approved in the past, would DTE agree, from an engineering perspective and with all other things equal, that:

i. Loss rates grow as load grows? If not, why not?

Answer: Yes, line loss rates grow as load grows from an engineering perspective and with all other things equal.

Attachments: *N/A*

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-8.24b.ii
Respondent: Y. Zhou
Page: 1 of 1

Question: On page 16, lines 19-22 of his testimony, Mr. Bilyeu stated that the company used an average line loss rate of 6.8% to "gross up" savings for distribution losses.

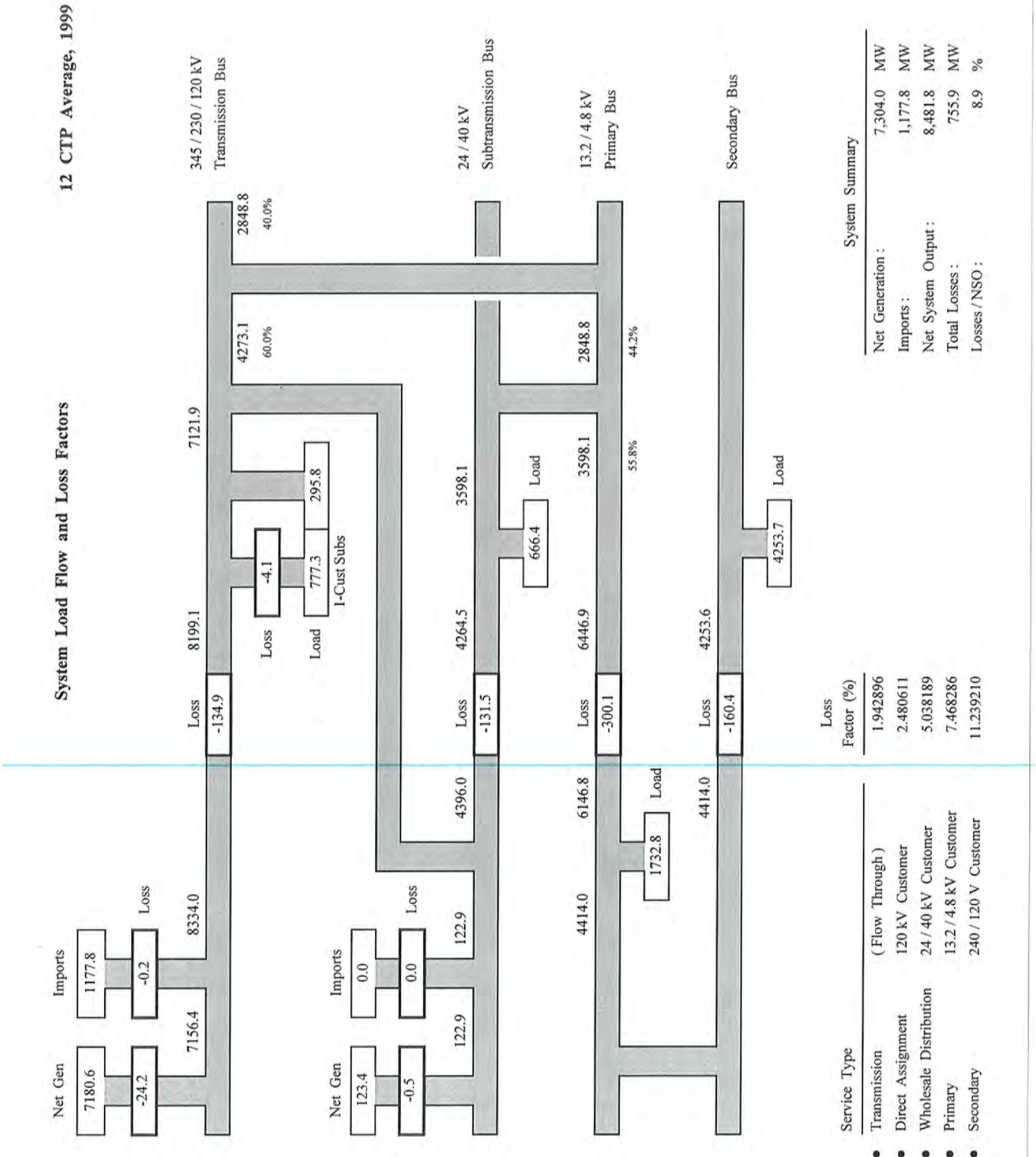
b. Regardless of whether the Company has analyzed or estimated its marginal line loss rates and regardless of what loss rates the MPSC has approved in the past, would DTE agree, from an engineering perspective and with all other things equal, that:

ii. Average loss rates at the times of peak demand are higher than average loss rates over the course of the entire year? If not, why not?

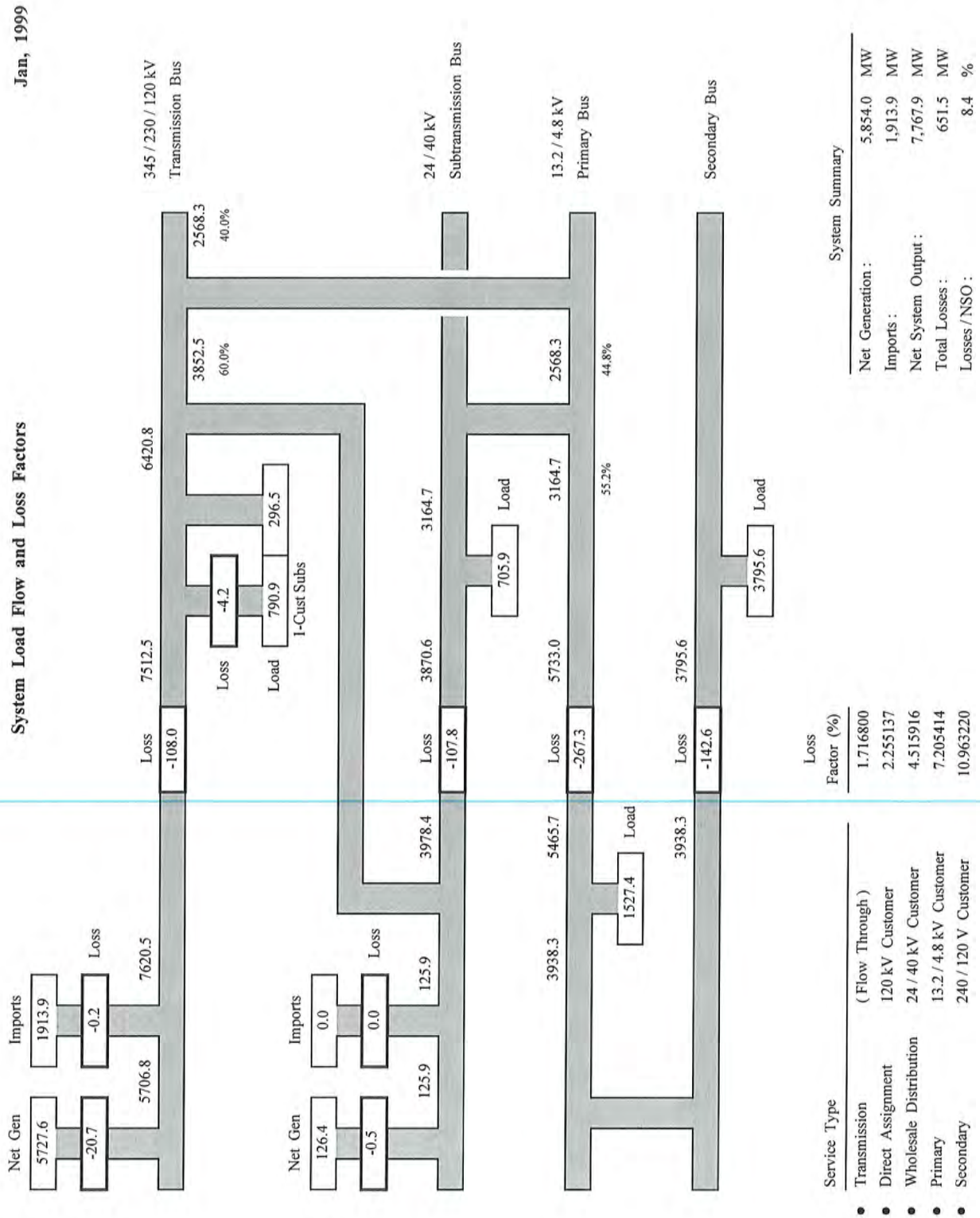
Answer: Yes, average line loss rates at the times of peak demand are higher than average line loss rates over the course of the entire year from an engineering perspective and with all other things equal.

Attachments: *N/A*

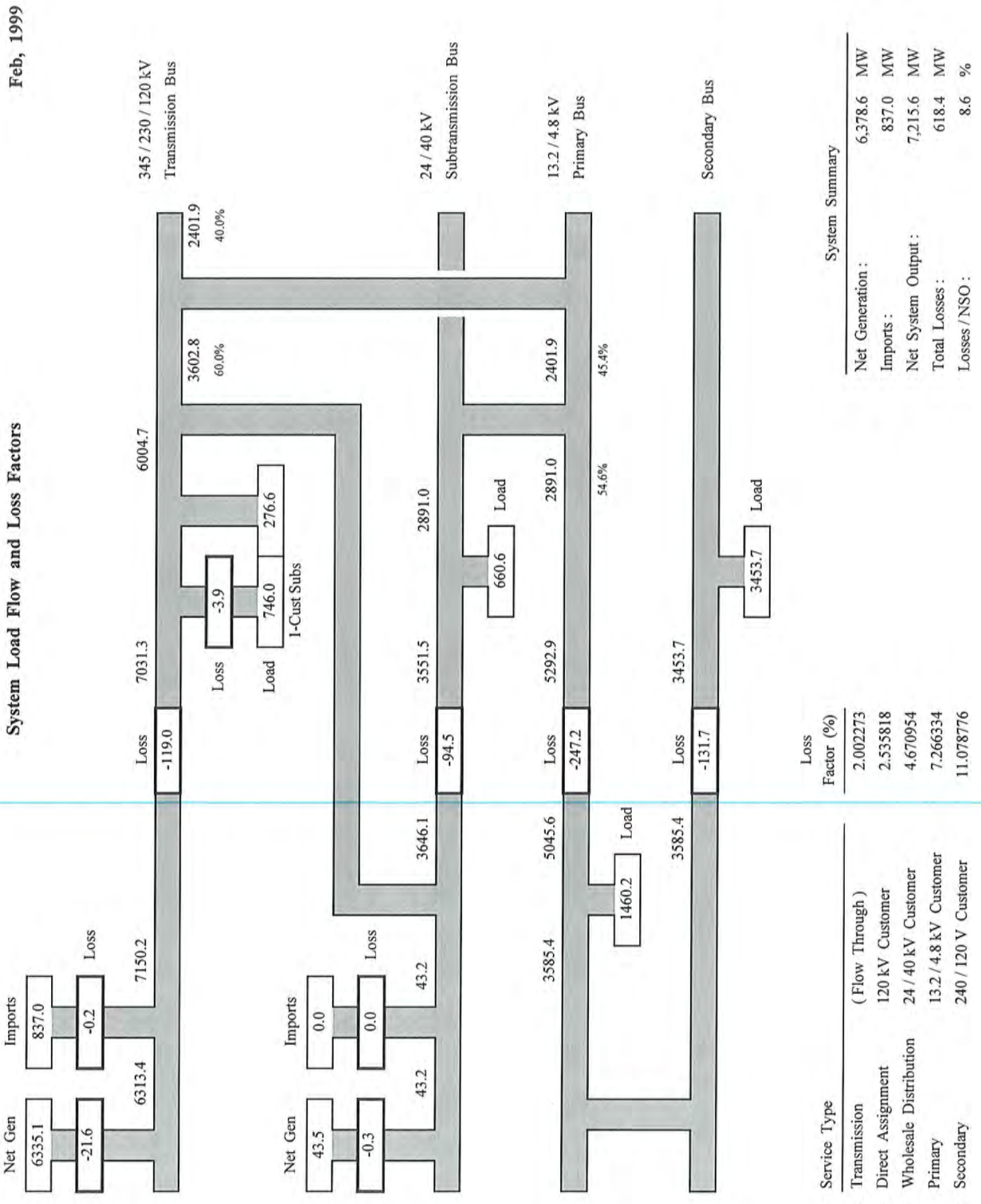
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



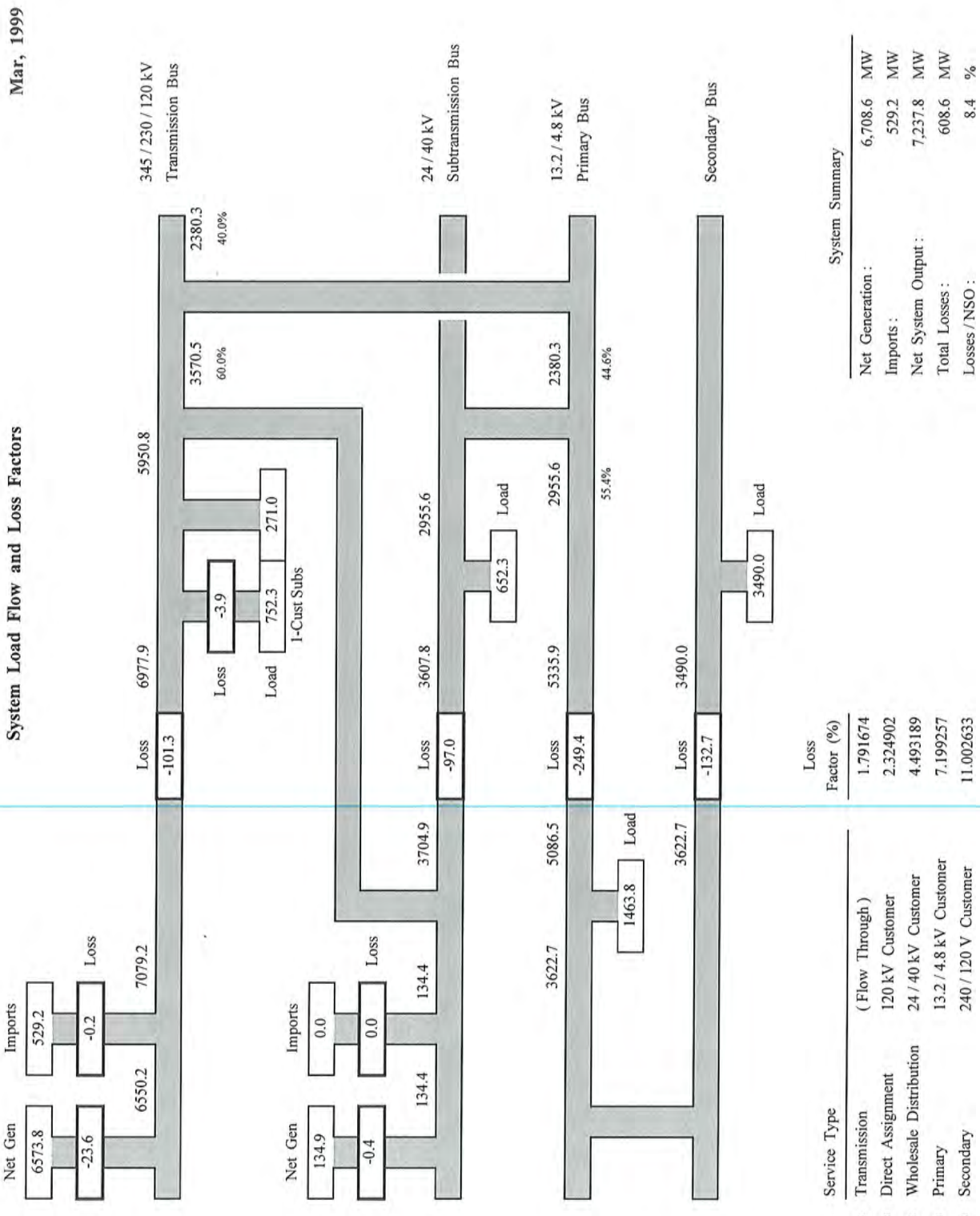
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



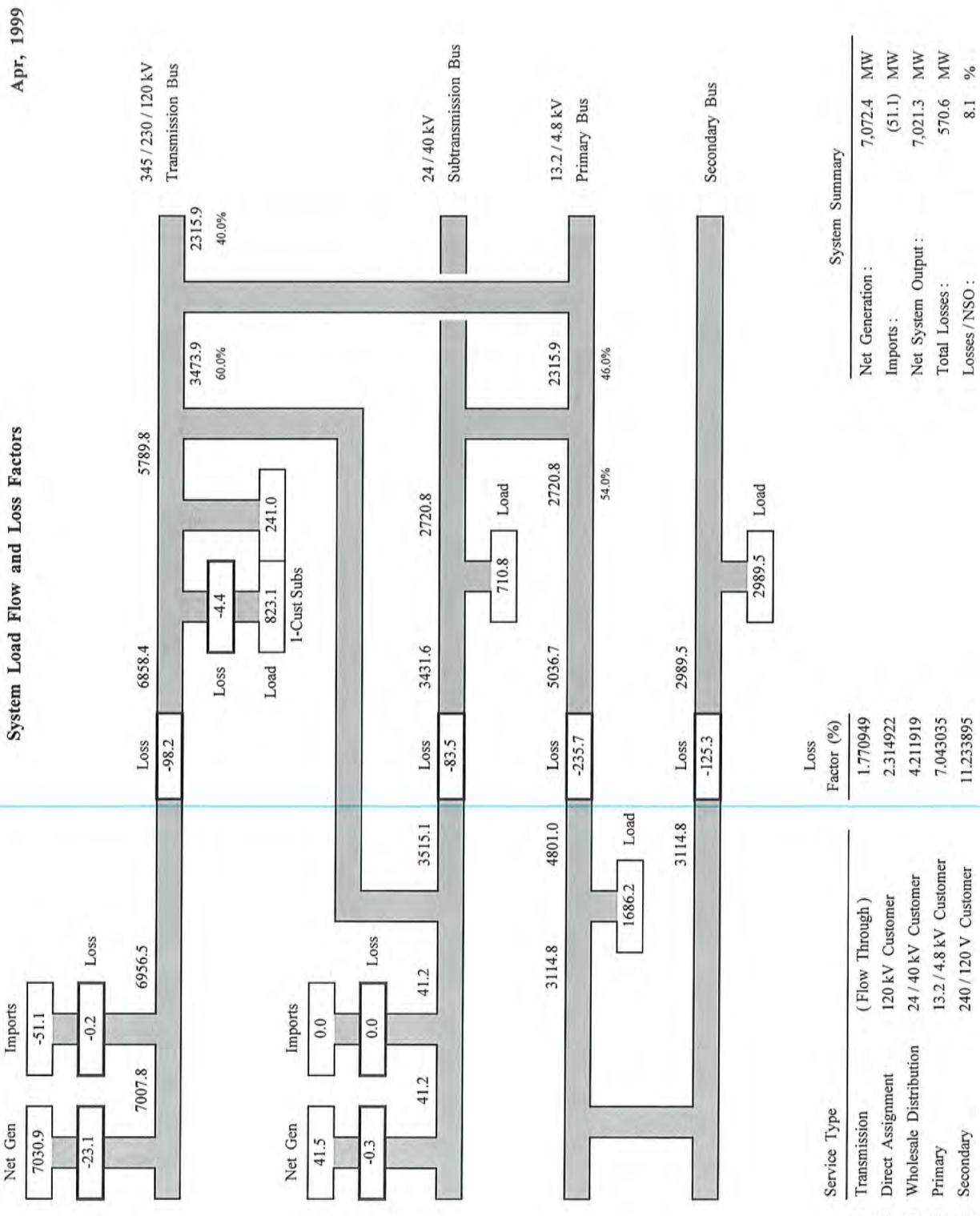
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



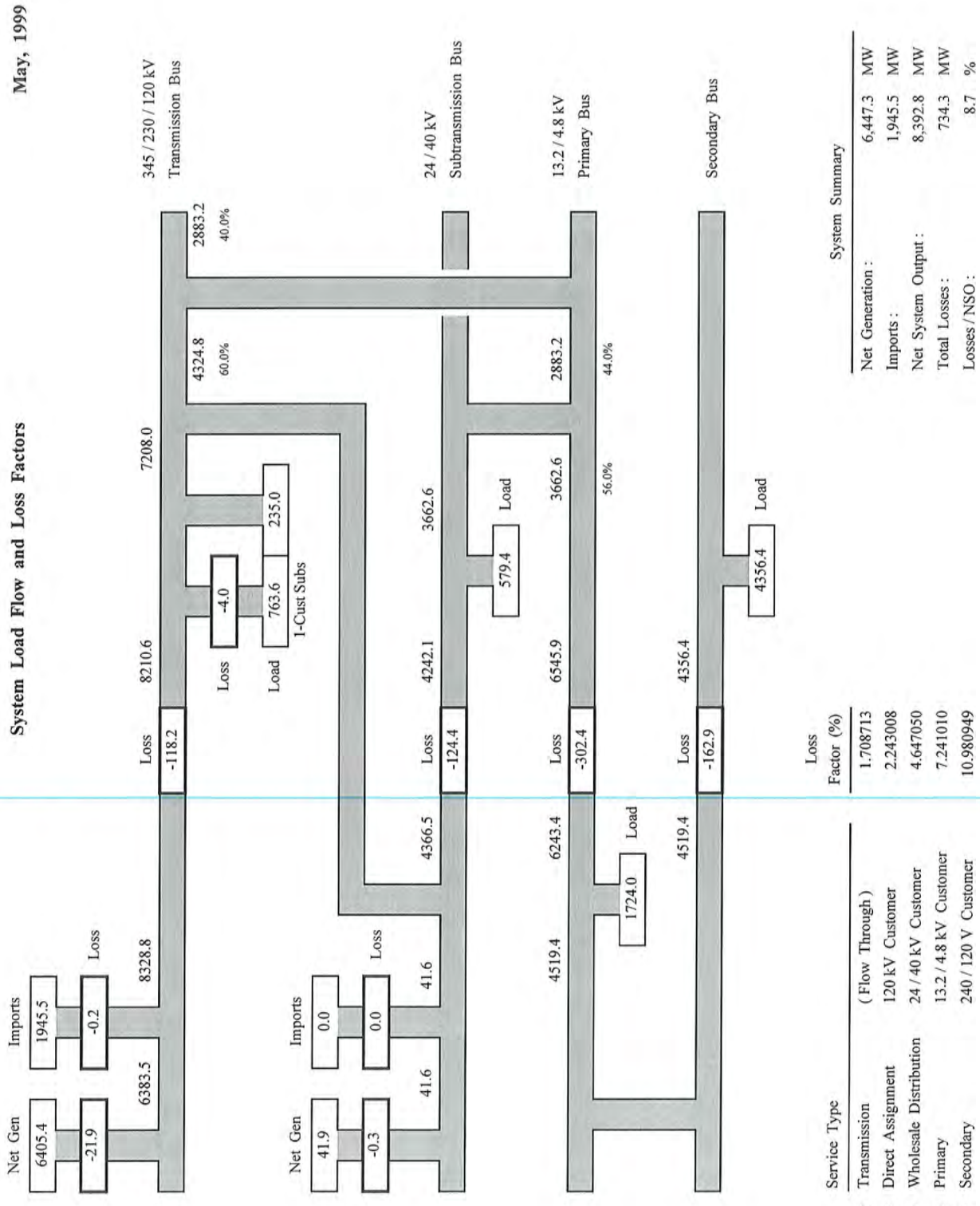
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



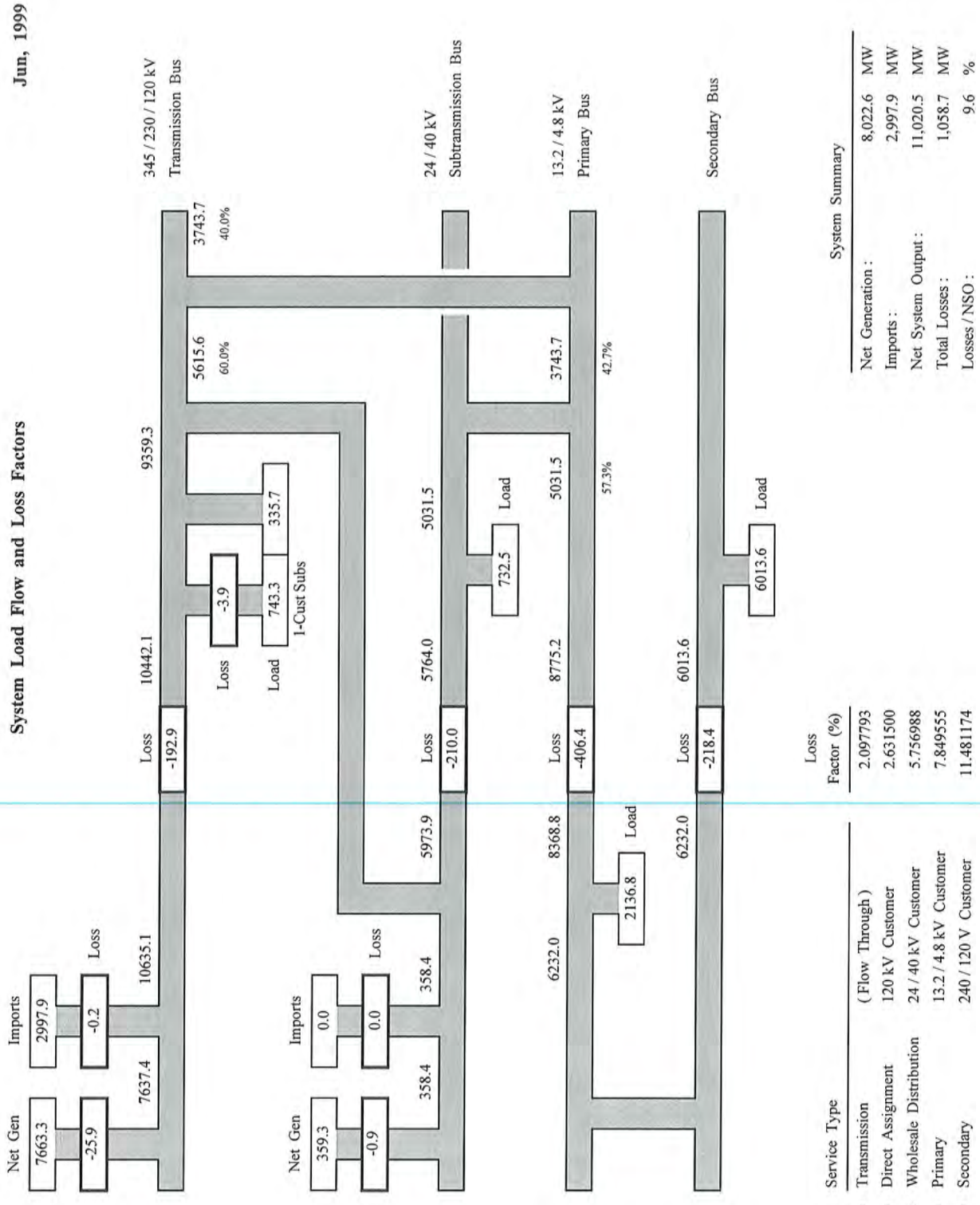
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



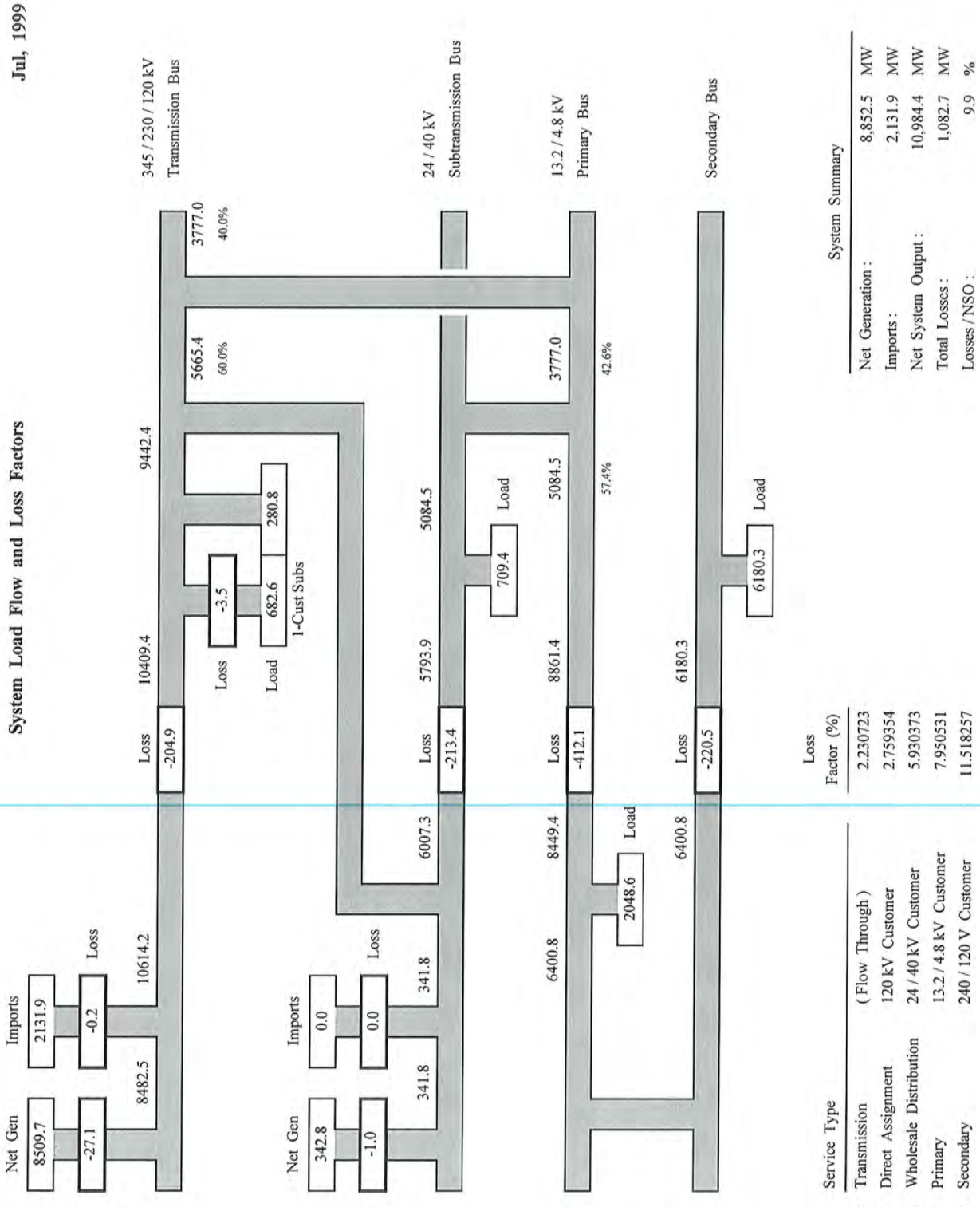
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



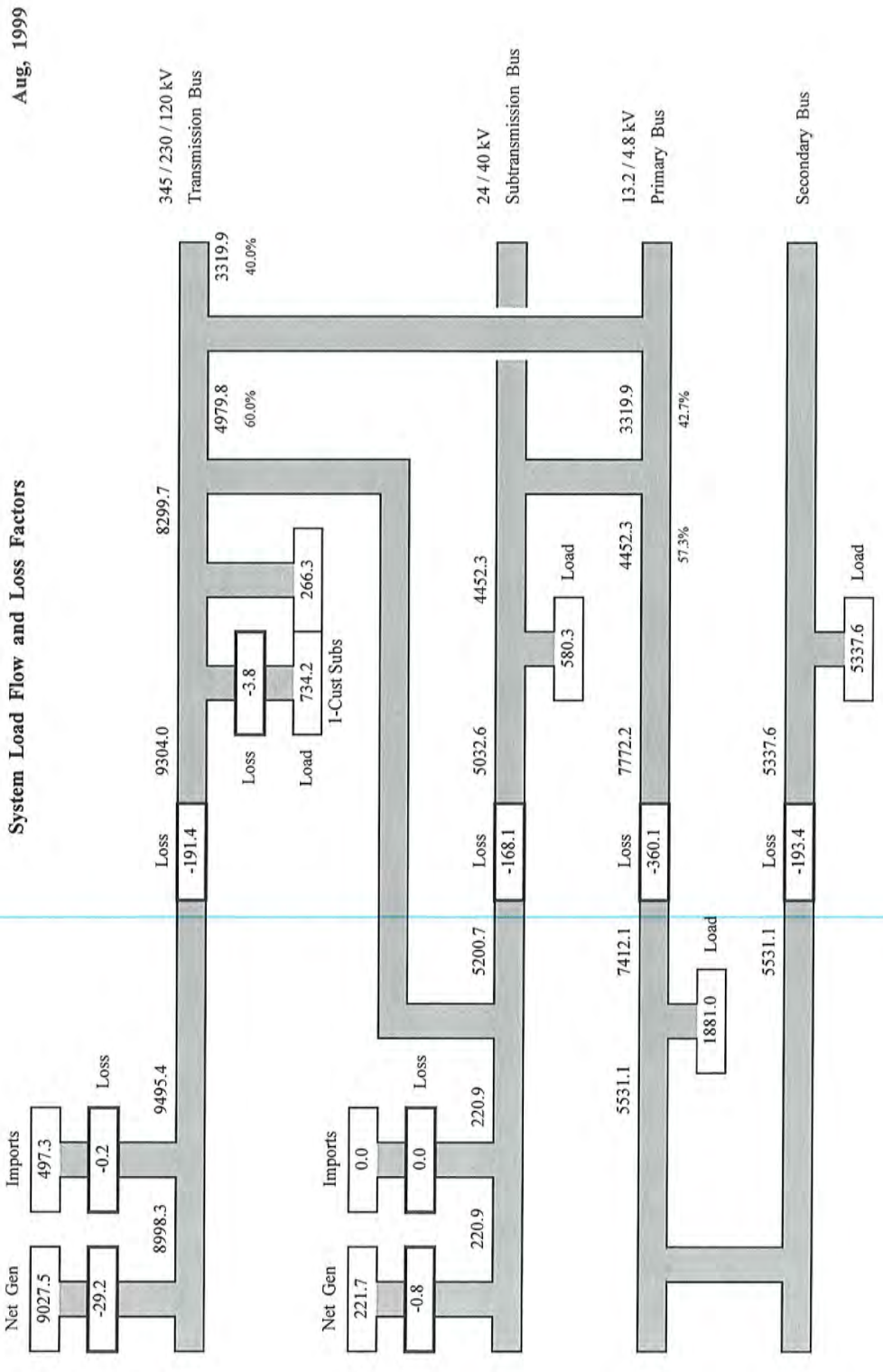
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



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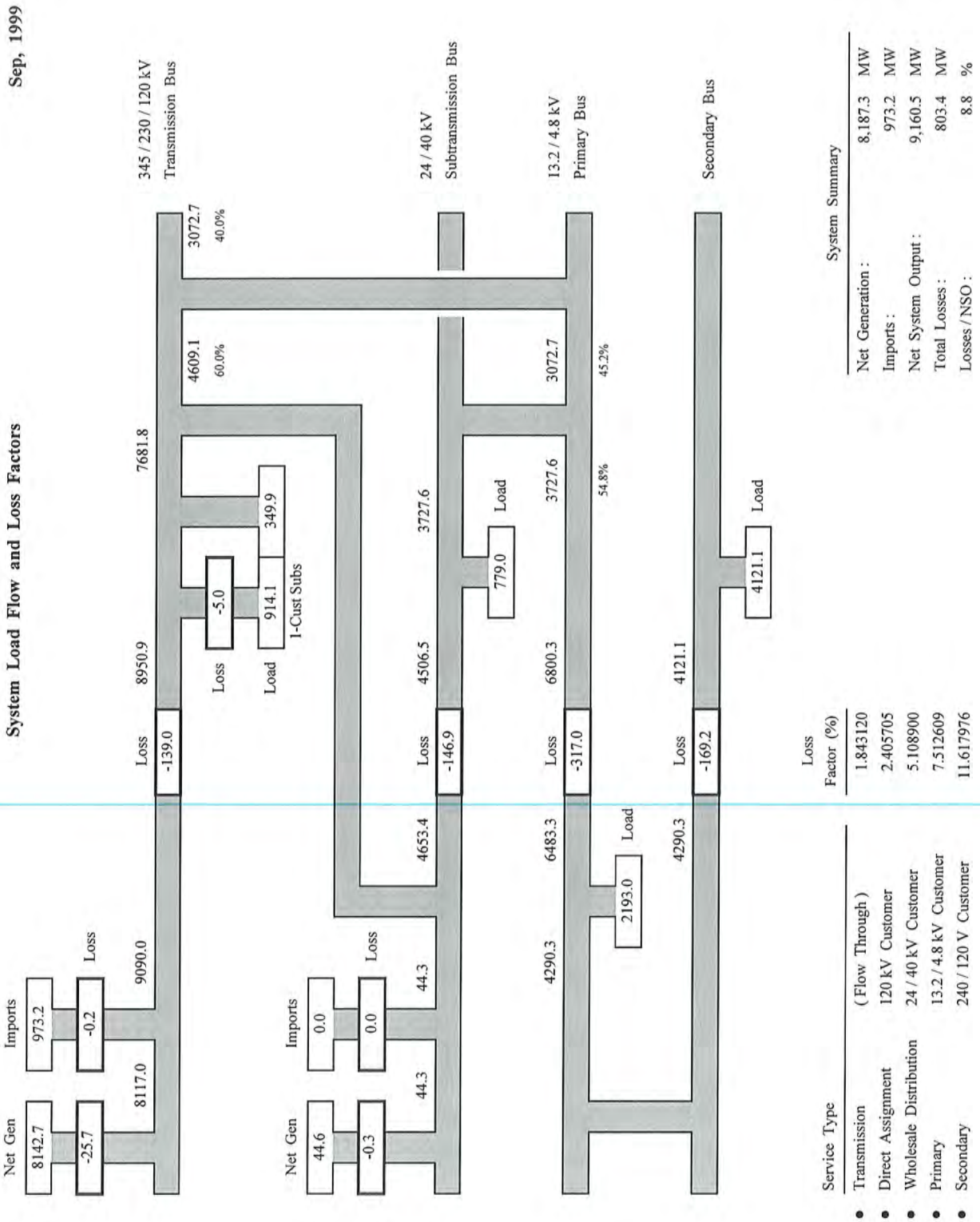
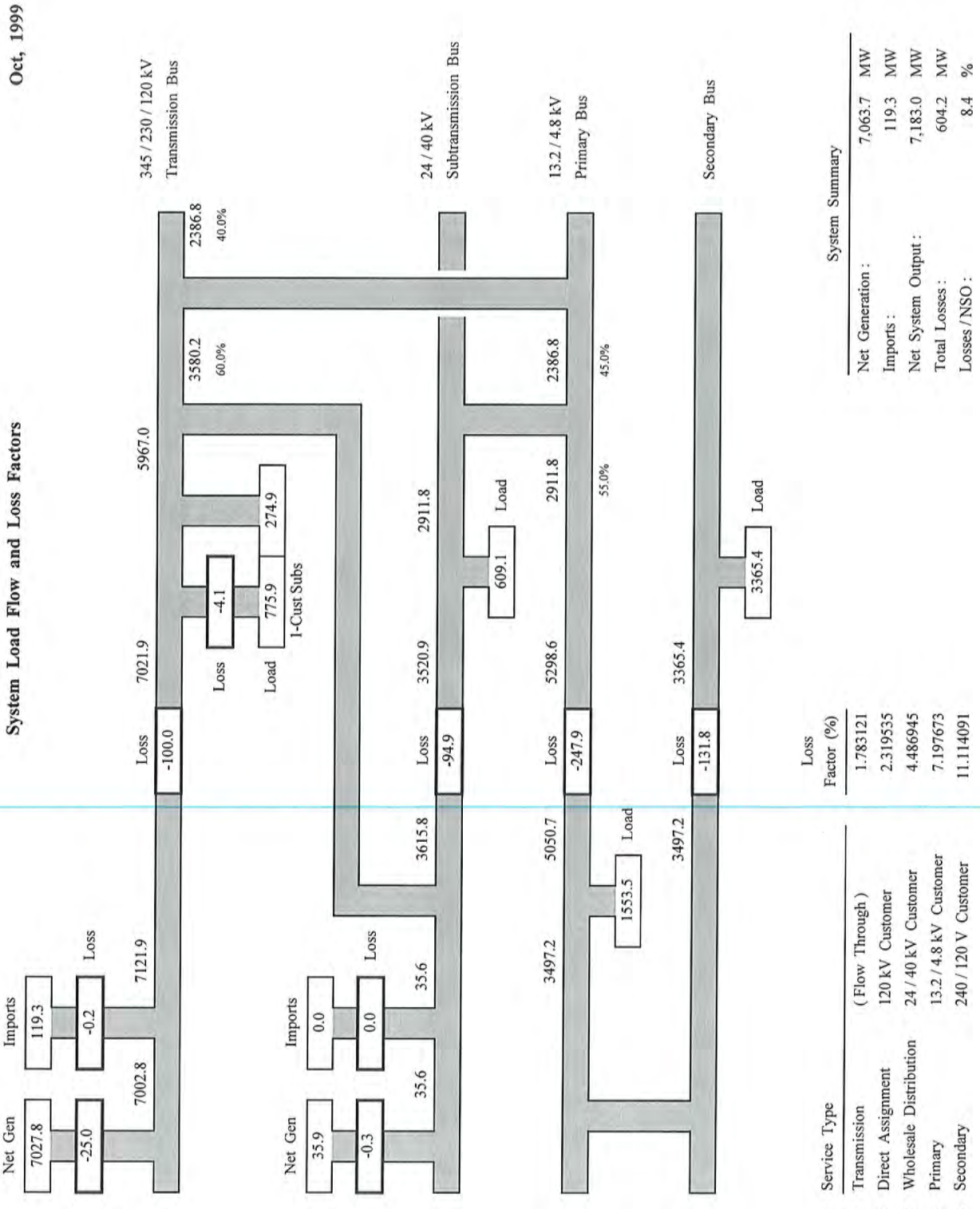
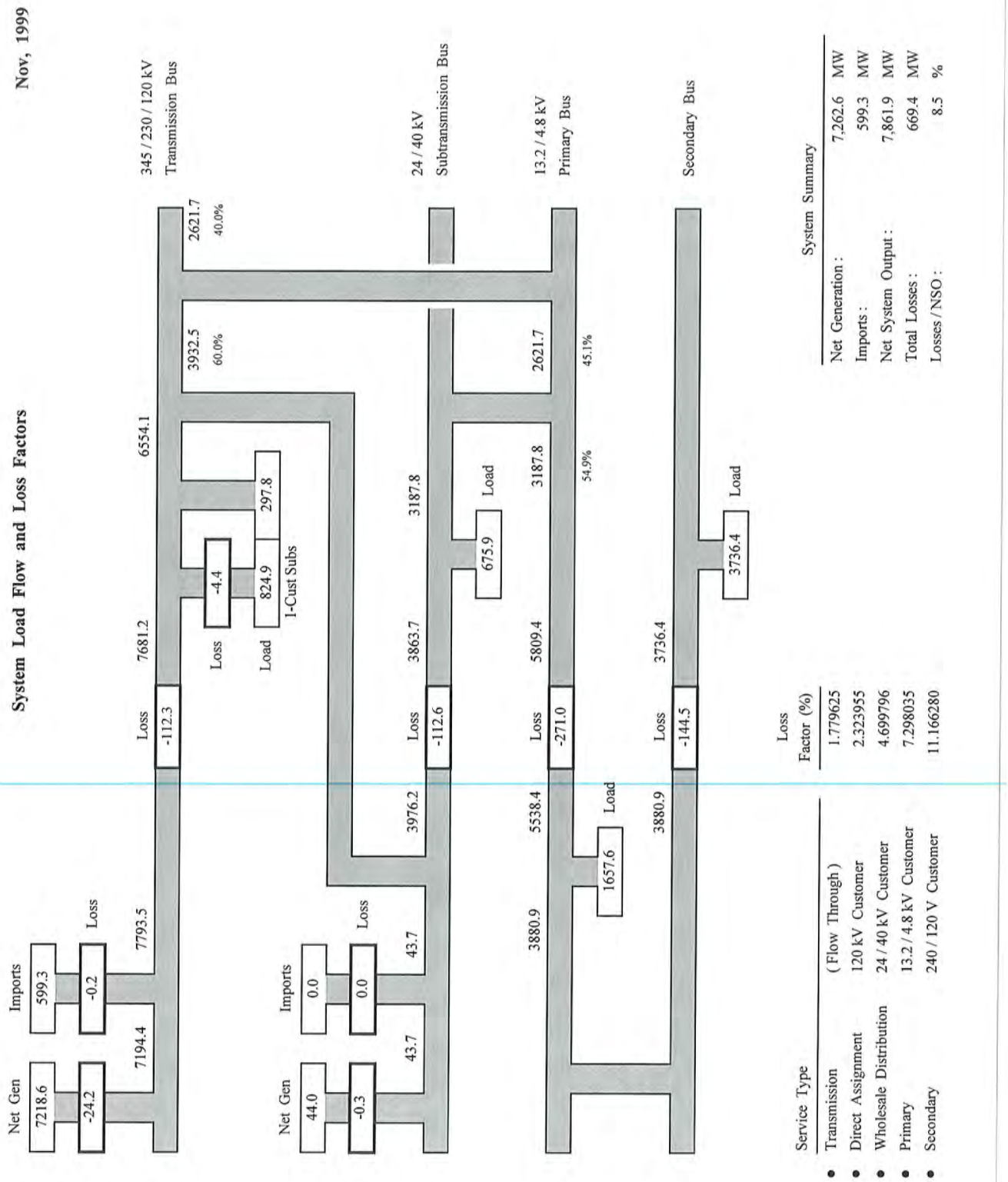
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



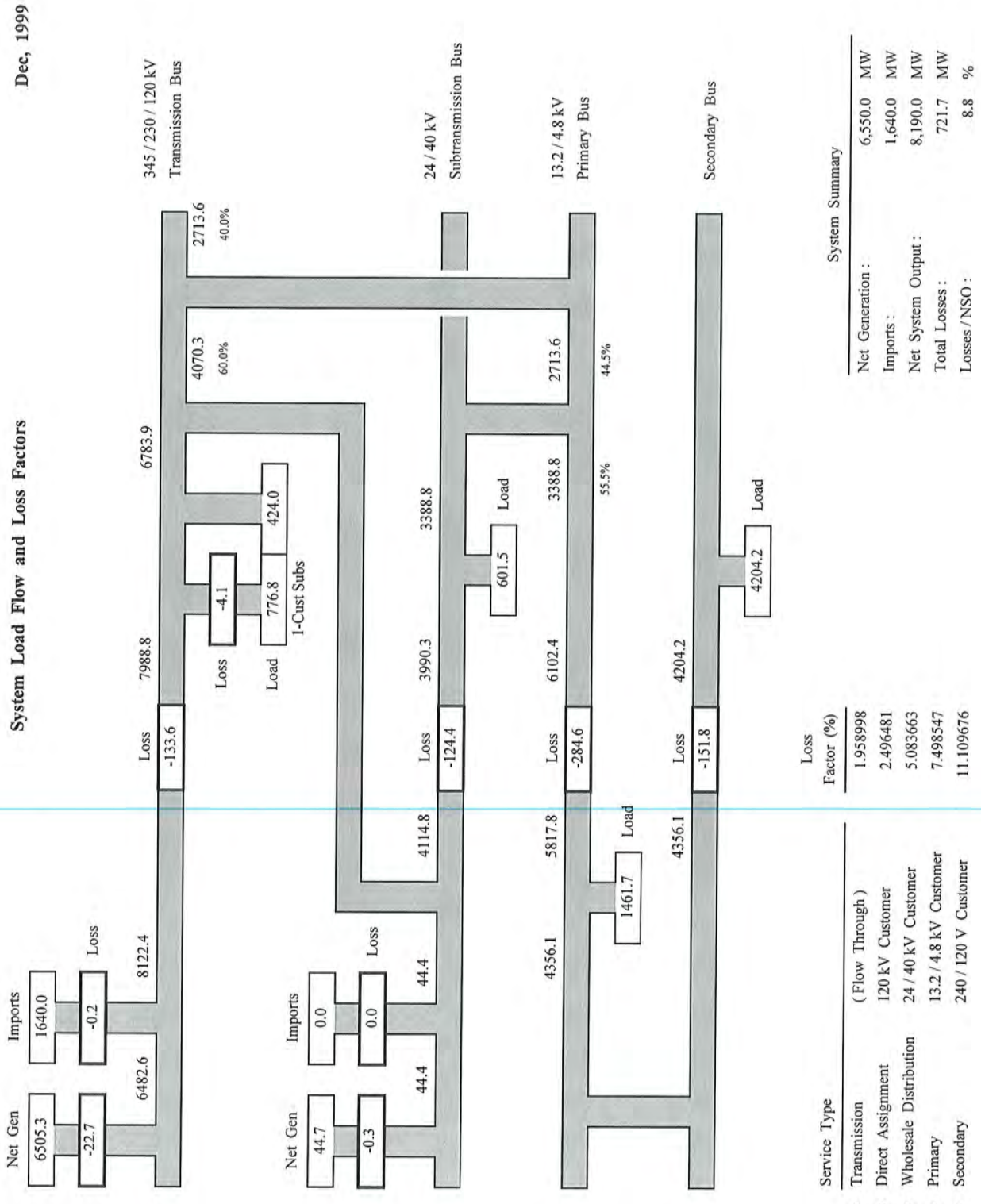
DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



DTE Electric Company
U-20471 MECNRDCSCDE-8.24a.i line loss study 1999



MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-6.15a]
Respondent:	M. B. Leuker
Page:	1 of 1

Question: Regarding Leuker workpaper MBL-15, the EWR values in cells C162-C196, E162-E196, G162-G196, I162-I196, K162-K196, M162-M196 and O162-O196:

a. Please explain what the numerical values represent. Are they the cumulative persisting annual savings, by end use, of the Company's past and forecast future EWR programs? If so, what level of program savings is assumed for each year from 2009? If not, what are they?

Answer: Numerical values represent the sum of new EWR savings in the subject year and any persisting values from prior years. Total EWR program savings in a given year are the sum of the constituent appliance savings represented in the referenced cells.

Attachments: *None*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-6.15b]
Respondent:	M. B. Leuker
Page:	1 of 1

Question: Regarding Leuker workpaper MBL-15, the EWR values in cells C162-C196, E162-E196, G162-G196, I162-I196, K162-K196, M162-M196 and O162-O196:

b. If the values are cumulative persisting annual savings, what are the incremental annual savings values associated with each of the cumulative values shown for each year? For example, in 2028, the "EWR cooling" is -135, or 2 GWh additional savings relative to the -133 GWh in 2027; that could represent 5 GWh of new incremental annual savings, 3 GWh of which offset the loss of savings from cooling measures installed in previous years that reach the end of their lives in 2027 (or 6 GWh of new savings, 4 GWh of which offset expiring savings or other combinations that lead to 2 GWh of savings growth).

Answer: Please refer to the attachment listed below.

Attachments:

The document listed below is available for download at the following hyperlink:
https://dteenergy.sharepoint.com/sites/DiscoveryPortal/Elec/U-204712019IRPPublic/default.aspx

U-20471 MECNRDCSCDE-6.15b Incremental Residential EWR Savings

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-6.15c]
Respondent:	M. B. Leuker
Page:	1 of 1

Question: Regarding Leuker workpaper MBL-15, the EWR values in cells C162-C196, E162-E196, G162-G196, I162-I196, K162-K196, M162-M196 and O162-O196:

c. Please provide the incremental annual savings values provided in response to subpart "b" as a percent of past and forecast future residential sales.

Answer: Please refer to row 53 on the EWR Historical Savings tab in the workpaper listed below.

Attachments: All non-confidential workpapers were included on the discs that were provided to parties at the pre-hearing conference on April 26, 2019. In addition, the workpapers can be accessed at the following hyperlink under MECNRDCSCDE-1:
https://dteenergy.sharepoint.com/sites/DiscoveryPortal/Elec/U-204712019IRPPublic/default.aspx

KLB-22 EWR Historical Savings and Spend

MPSC Case No.: U-20471
Requestor: MECNRDCSC
Question No.: MECNRDCSCDE-6.15d]
Respondent: M. B. Leuker
Page: 1 of 1

Question: Regarding Leuker workpaper MBL-15, the EWR values in cells C162-C196, E162-E196, G162-G196, I162-I196, K162-K196, M162-M196 and O162-O196:

d. How were these values derived?

Answer: Total annual incremental EWR savings are derived from annual incremental EWR savings for constituent appliance classes.

Attachments: *None*

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-6.15e
Respondent:	M. B. Leuker
Page:	1 of 1

Question: Regarding Leuker workpaper MBL-15, the EWR values in cells C162-C196, E162-E196, G162-G196, I162-I196, K162-K196, M162-M196 and O162-O196:

e. Please provide an Excel file with the calculations showing their derivation.

Answer: Please refer to the attachment listed below.

Attachments: The document listed below is available for download at the following hyperlink:
https://dteenergy.sharepoint.com/sites/DiscoveryPortal/Elec/U-204712019IRPPublic/default.aspx

U-20471 MECNRDCSCDE-6.15e Derivation Incremental Residential EWR Savings

MPSC Case No.:	U-20471
Requestor:	MECNRDCSC
Question No.:	MECNRDCSCDE-6.15f]
Respondent:	M. B. Leuker
Page:	1 of 1

Question: Regarding Leuker workpaper MBL-15, the EWR values in cells C162-C196, E162-E196, G162-G196, I162-I196, K162-K196, M162-M196 and O162-O196:

f. The sum of all the end use EWR values peaks (i.e. is at its highest negative value) in 2021 and then declines by about one-third by 2030 and by half by 2040. Why is that? If these values are supposed to represent the impacts of 1.50% of residential EWR each and every year, shouldn't the cumulative annual savings continue to grow past 2021 given that the level of savings being modeled (1.50% per year) is a higher level of savings than achieved in 2009 through 2017. If not, why not?

Answer: Expiring EWR has a net subtractive effect on total annual EWR in the referenced years.

Attachments: *None*

DTE Electric Company
MECNRDCSCDE-6.15b Incremental Residential EWR Savings
Sheet1

Case No.: U-20471
Respondent: M. B. Leuker-K. L. Bilyeu
Page: 1 of 2

U-20471 MECNRDCSCDE-6.15b Incremental Residential EWR Savings

Year	Savings (GWh)
2009	125
2010	222
2011	332
2012	336
2013	341
2014	339
2015	310
2016	296
2017	404
2018	330
2019	296
2020	220
2021	203
2022	189
2023	196
2024	220
2025	242
2026	245
2027	242
2028	259
2029	255
2030	238
2031	200
2032	203
2033	203
2034	187
2035	182
2036	191

DTE Electric Company
MECNRDCSCDE-6.15b Incremental Residential EWR Savings
Sheet1

Case No.: U-20471
Respondent: M. B. Leuker-K. L. Bilyeu
Page: 2 of 2

2037	207
2038	199
2039	199
2040	199
2041	199
2042	199

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the Application of **DTE Electric Company** for approval of its integrated resource plan pursuant to MCL 460.6t, and for other relief.	Case No. U-20471 ALJ Sally L. Wallace

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PROOF OF SERVICE

On the date below, an electronic copy of **Direct Testimony of Christopher Neme on behalf of Michigan Environmental Council, Natural Resources Defense Council and Sierra Club along with Exhibits MEC-44 through MEC-52** was served on the following:

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The statements above are true to the best of my knowledge, information and belief.

OLSON, BZDOK & HOWARD, P.C.
Counsel for MEC-NRDC-SC

Date: August 21, 2019

By: Digitally signed by Breanna Thomas
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